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LOCOMOTIVE EXPERIMENTS BY JOHN E. MARTIN.

(Continued from page 350.)

CONCEPCION, March, 1877.

To the Committee on Locomotive Tests, American Railway Master Mechanics' Association:

GENTLEMEN: In reply to your circular of 15th September, 1876, I send inclosed notes, indicator diagrams and sheet of experiments.*

I commenced my experiments about a year and a half ago by applying the indicator to the cylinder of a Baldwin passenger engine, cylinders 15×24 in., to see if it would indicate the presence of water in the cylinder.

This engine had a diamond stack, with cone and netting. The cone was perforated with small holes to enable the engine to get up steam more readily. When this was done, the engine, when working with a light train of three American passenger cars, continually threw drops of water out of the stack, more especially when the throttle valve was still further opened. This evidently showed that condensed steam lodged in the steam or exhaust passages. The cone and netting were taken out, and the engine did not throw quite so much, simply because it was thrown clear of the train.

Blow-off cocks were fitted to the exhaust passages, and when left open while the locomotive was working made some improvement. The locomotive worked this way for some months, when the wood lagging of the cylinders was reduced from 2 in.

New Valves.—Outside lap, $\frac{1}{2}$ in.; inside clearance, $\frac{1}{2}$ in.; lead in full gear, 0; in first notch, $\frac{1}{8}$ in. In each engine this proved an economy of 10 per cent. or 12 per cent.

FREIGHT ENGINES.

Engines Nos. 3, 4 and 5, Roger mogul freight engines, cylinders, $16 \frac{1}{2} \times 24$ in., had valves of following arrangement: Outside lap, $\frac{1}{2}$ in.; inside lap, $\frac{1}{2}$ in.; lead in full gear, $\frac{1}{8}$ in.; in first notch, $\frac{1}{8}$ in. full; greatest travel of valve, $\frac{1}{2}$ in.

The inside lap was cut out of these valves. The result was an improvement in the steaming of the engines. It also proved economical.

A wrought iron strip was then riveted to the valves of No. 5 engine, making lap $\frac{1}{2}$ in. Lead was 0 in full gear and $\frac{1}{8}$ in. in first notch.

This alteration was a decided improvement in decreasing the consumption of coal.

New valves were then put in each of the three engines, having $\frac{1}{2}$ in. outside lap, $\frac{1}{2}$ in. inside clearance; lead in full gear, $\frac{1}{8}$ in.; lead in first notch, $\frac{1}{8}$ in. The gain in lead was reduced by setting the valve $\frac{1}{8}$ in. blind in full gear back. This reduced the gain in lead nearly $\frac{1}{8}$ in. (The valves of the passenger engines were set in the same way.) The economy of these alterations I would put down at 15 per cent., and even more in the case of light trains. The engines with this lap were what an engineman would call "lozy" in starting a train, but once under way they worked very "free," and would pull the same load at a greater speed than formerly.

The distribution of steam with this arrangement of valve is, I think, excellent, as may be seen by different series of indicator diagrams taken from cylinder of No. 4 engine at different speeds, notches, boiler pressures, and with different sizes and arrangements of exhaust nozzles. The consumption of water per indicated horse power per hour being little over 20 lbs. in the second and third notches, when the engine does all her work with 140 lbs. of steam.

Baldwin mogul freight engines, 18×24 in. cylinders, had valves by no means suited to this easy road, and where the trains are never very heavy, not often exceeding 30 American box cars containing 10 tons each.

The average of these valves was as follows: Outside lap, $\frac{1}{2}$

coal per car mile; with an average of 16 loaded cars the consumption will be 15 per cent. less per car mile, and with an average of 23 loaded cars the consumption will be 30 per cent. less per loaded car mile. It is difficult to determine a slight economy on a freight engine with exactness.

EXPERIMENTS WITH NO. 7 ROGER PASSENGER ENGINE, 15×24 IN.

Smoke Stack.—This engine had a large bonnet stack fitted with a winged cone, but without netting; exhaust nozzles, $2 \frac{1}{2}$ in. diameter.

The cone was taken out and an open pipe put into stack tapering from 13 in. at base to 15 in. at top; length, about 6 ft. This improved the steaming of the engine, and the nozzles were enlarged to $2 \frac{1}{2}$ in. with this form of stack. The engine threw a great deal of water in starting.

The engineman complained of this and asked to have the cone put in. The open pipe was taken out and the cone placed as before. After running three round trips with small and with large nozzles, the increased consumption of coal was so patent that the engineman said he could put up with the water at start, and would have the open pipe in the stack.

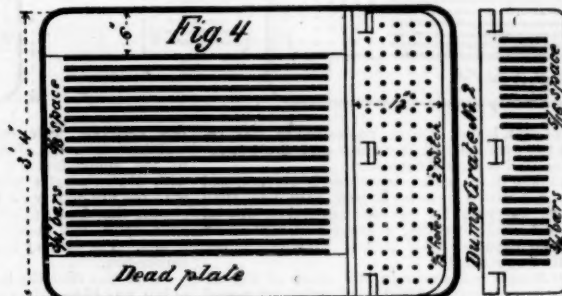
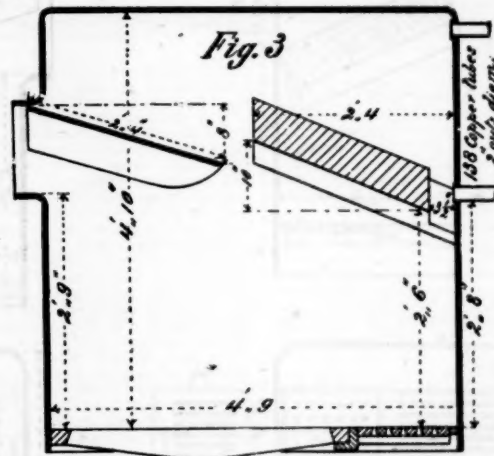
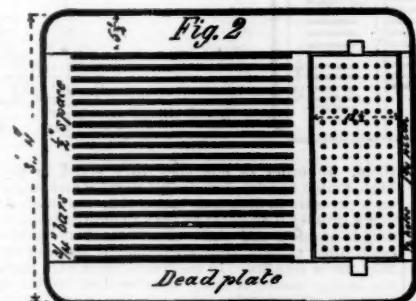
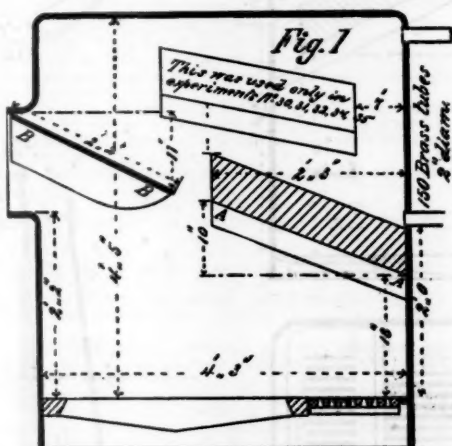
Several trials were made with and without the open pipe, and the economy I would state at 10 per cent.

In view of the good results obtained from this open pipe, another pipe 12 in. in diameter and parallel was placed inside the first one. Although it did not prove any additional economy, it was no detriment and was taken out. When this small pipe was used the coal formed a heavier clinker on the bars, but whether owing to the pipe or inferior coal I cannot say.

Dead Plates.—This engine had dead plates running along the side of the box, and its entire length 4 ft. 3 in. long and $5 \frac{1}{2}$ in. wide, shown in accompanying drawings. [Fig. 2]. From the back of box for a length of 3 ft. 2 in. these dead plates had $\frac{1}{4}$ in. planed off the edge next the fire-bars, and two rows of $\frac{1}{4}$ in. holes were bored through the plate, leaving a dead part of 3 in. wide next the side of fire-box. These alterations improved the steaming of the engine, but the consumption of fuel was very much increased.

After running awhile this way two dead plates $5 \frac{1}{2}$ in. wide were placed over the perforated dead plates and the consumption of coal was immediately reduced.

With the same consumption of water, the coal in one place



to 1 in., and hair felting placed next the cylinders. The cavities in the saddles of the cylinders between the steam and exhaust passages were filled with cement and sand, and a sheet-iron plate bolted up to casting to prevent it from falling out. This was found to be a great improvement, and with the relief cocks closed the annoyance was almost entirely got rid of.

The indicator, although it did not reveal the presence of water in the cylinder, indicated that the valves were set with too much lead, especially in the first notch from centre or mid-gear.

The arrangement of valves was as follows: Outside lap, $\frac{1}{2}$ in.; inside lap, $\frac{1}{2}$ in.; lead in full gear, $\frac{1}{8}$ in.; lead in first notch from centre, $\frac{1}{8}$ in.; greatest travel of valve, $\frac{1}{2}$ in.

The lead was reduced by riveting a strip of wrought iron to valve $\frac{1}{4}$ in. thick, which increased the lap to $\frac{1}{4}$ in. This simple alteration reduced the consumption of coal about 15 per cent. This economy I attribute to a better distribution of steam, and because the steam, with the same sector, was worked more expansively by the increased lap. Weight of train, including engine and tender, never exceeded 200,000 lbs., consisting of four passenger cars.

The iron strips on valves causing some trouble, new valves were substituted, having outside lap $\frac{1}{2}$ in. the lap being increased to allow of still more expansive working. To decrease compression, the valves had $\frac{1}{2}$ in. inside clearance. To keep the point of release about the same, the lead was reduced fully $\frac{1}{8}$ in., making the lead rather less than $\frac{1}{8}$ in. in the first notch. (This lead has been still further reduced to $\frac{1}{8}$ in. and with an economy in the consumption of water.) The indicator diagrams show that the distribution of steam with the new valves was as good if not better than that of the old valves, fitted with the wrought iron strip. Three engines of this class were altered in a similar manner, and in each case with equal success, all the engines running on same train.

Two engines of Rogers' build, running on the same train, were fitted with new valves.

Old Valves.—Outside lap, $\frac{1}{2}$ in.; inside lap, $\frac{1}{2}$ in.; full lead in full gear, $\frac{1}{8}$ in.; in first notch, $\frac{1}{8}$ in.; greatest travel of valve, $\frac{1}{2}$ in.

in.; inside lap, $\frac{1}{2}$ in.; lead in full gear, $\frac{1}{8}$ in.; lead in first notch from centre, $\frac{1}{8}$ in.; greatest travel of valve, $\frac{1}{2}$ in.

A brass strip $\frac{1}{4}$ in. thick was riveted to valves of No. 11 engine making arrangement as follows: Outside lap, $\frac{1}{2}$ in.; lead in full gear, 0; lead in first notch, $\frac{1}{8}$ in. This greatly improved the engine as regards economy in fuel.

New valves were then put in two engines, having outside lap $\frac{1}{2}$ in.; inside clearance, $\frac{1}{2}$ in.; lead in full gear, 0; lead in first notch, $\frac{1}{8}$ in.

The economy was in this case at least 20 per cent.

The engines, before the alterations, could not make the distance of 36 miles between two water stations with 30 cars, and they now do it easily with a heavier train; capacity of water tank, 1,500 imperial gallons. I cannot say that the additional $\frac{1}{4}$ in. of lap made any improvement in the distribution of the steam, but it was done to enable the engines, with their present sector, to work the steam more expansively.

With the additional lap in all these engines, we are enabled to use steam 10 to 15 lbs. higher in pressure with more advantage, and in every case the pressure was increased that amount, which certainly contributed to the efficiency of increased lap and decrease of lead.

You may think I am very precise in stating the exact amount of economy effected by certain alterations, but what is the use of saying "economy was effected," without stating the amount? The amount of economy given is as near the mark as I am able to judge.

I think the only correct way to determine the relative efficiency of certain alterations is by running the engines on exactly the same train, with same steam pressure, working in the same notch, carefully measuring the water and weighing the coal. This we have been able to do with the passenger engines. With freight engines it is more difficult, owing to varying weight of train, the amount of shunting done in stations, varying load in cars, force of wind, running to make up time and varying positions of reverse lever.

The amount of work done by the engines is expressed in pounds per loaded car mile. The average number of cars hauled by each engine (loaded and empty) is ascertained very correctly from the freight-car mileage book.

Even with the average number of cars hauled, it becomes difficult to compare the work done per car mile. An engine with an average of say 13 loaded cars will run with 3 lbs. of

was nearly 15 per cent. less with the $5 \frac{1}{2}$ in. dead plates.

Dead plates 6 in. wide have been placed in five engines and with a marked economy. In fact, I think a judicious arrangement of grate bar opening and dead plates will affect as great an economy as any other single improvement in a locomotive, especially when very light firing is attempted.

In accompanying sheet of experiment will be found some trials with an additional dead plate down the middle of the bars or grate, in one case 5 in. wide and in another 7 in. wide. It will be seen that the result was an economy. The use of this 7 in. dead plate down the middle of grate is an economy only when the coal is very good and free from small coal and dirt. A similar dead plate 6 in. wide was placed in fire-box of No. 9 engine (this box is shown in accompanying drawing [Fig. 3]), but did not prove economical, owing to the smaller opening of air spaces between bars. The engine was using dump grate No. 2 when the plate was tried.

I cannot exactly state the good effect of dead plates, but think it is owing to two or three causes:

They regulate the quantity of air required through the bars with more efficiency than the damper; when placed next the side of fire-box they prevent the cold air from coming in contact with the side sheets, and they prevent the too rapid combustion of the coal, or allow it to coke and more slowly distill its gases. To this latter effect I am inclined to attribute some importance, especially in locomotives with large fire-boxes burning a small amount of coal per hour. The economical use of dead plates is much more marred in the combustion of Chili coal—a coal that does not clinker and contains a large proportion of gaseous carbon. Dead plates by reducing the amount of air entering through the bars proportionately increase the quantity entering through the door, a result beneficial to the perfect combustion or prevention of smoke.

Dump Grate.—Dump grate No. 2, see drawing [Fig. 2] in the form of bars, having more air space than dump grate with small holes, was tried in this engine, but with inferior results. In freight engines, however, this change proved very successful. The reason no economy was obtained in No. 7 engine was owing to small amount of coal used per hour and the sufficiency of air provided with the old dump grate.

Brick Arch.—A brick arch [see A. 4, Fig. 1] was fitted in this engine, with good results, both as regards economy and prevention of smoke. Indeed, with a good arch fitting close to

*The diagrams and sheet of experiments were published in the last number of the Railroad Gazette.

the draft was suffocated and the smoke could not get out of the stack, but issued out of every possible opening in smoke-box.

In connection with this I give a table of two series of experiments with the petticoat pipe.

A movement of a few inches in the top part of petticoat pipe does not make any difference on the vacuum gauge.

When the lower portion was lowered from 13 in. the fire next the tube-sheet was worked and the engine threw a great deal more coal and cinders. By raising the petticoat pipe at the top the same effect takes place in a less degree, simply because the draft is concentrated in the lower part of smoke-box, and the lower tubes are drawn or worked. The effect of raising and lowering the lower part of pipe is beautifully seen by standing on the railing around the front of engine, where the smallest cinder can be seen coming out of the stack. As the pipe is lowered the number of cinders increases, until they are thrown out in large quantities. If the pipe is now raised, they will immediately cease to appear. This was tried a number of times and always with the same effect.

Blast Pressure.—With the high and low double nozzles the blast pressure in mercury was exactly equal to the vacuum in water, that is, with vacuums up to $\frac{3}{4}$ in. Above this, the movement of the mercury was so great as to prevent anything like reliable readings. It appears, however, that with higher vacuums than $\frac{3}{4}$ in. the blast pressure was still greater than the vacuum.

In the single high nozzle the blast pressure in mercury was exactly $\frac{1}{2}$ in. greater than the vacuum in water, that is, up to $\frac{3}{4}$ in. With higher vacuums the blast pressure was still greater. Except in starting, the vacuum gauge is read without difficulty and is at all times very sensitive.

Vacuum in Cylinders.—Water was substituted for mercury in the blast pressure gauge, and the vacuum in the cylinder, while running without steam, observed.

With the $\frac{4}{8}$ in. single nozzle the vacuum shown on gauge at 130 revolutions per minute was 1 in., with reverse lever in full gear. When the reverse lever was drawn up to first notch from centre, the vacuum rose to $\frac{3}{4}$ in.

This was tried several times. The effect of opening or closing the cylinder cocks was scarcely perceptible on the gauge. This vacuum in the cylinders was not tried with the double nozzles, but I believe the vacuum would be much greater.

When the blast pressure gauge indicated these vacuums, the vacuum gauge did not indicate a vacuum in the smoke-box.

INDICATOR DIAGRAMS—ENGINE NO. 4.

This series of indicator diagrams was taken with the view, principally, of noticing the effect of exhaust nozzles of different diameters and height, and the comparative effect of single and double nozzles.

With this view the diagrams were taken with the throttle valve wide open and at a good speed, since defects are then more exaggerated. Only those diagrams that are thoroughly reliable are given.

I would state, in connection with them, that it is impossible to guarantee the accuracy of the number of revolutions to within 8, or, at very high speeds, 12.

The indicator springs have been carefully tested and found to be perfectly correct. With very few exceptions the indicator pencil has traced the figure more than once, and always over the first line. I inclose one or two cards as samples of its correct working.

They were taken with this object, and the number of times the pencil went over the line counted, in one case 6, in another 20 times.

The steam gauge of the engine has also been corrected, and the boiler pressure given on each card can be relied upon to within 1 or 2 lbs.

In taking a diagram care was taken that the boiler was not too full of water, the amount of water in boiler being noted on each card, and that there was no water in the cylinder or indicator connections.

These cards, with one or two exceptions, give no information as to the power required to haul the train, the throttle being opened wide a little before the figure was taken.

The engine does all her work, with the exception of starting, and at a few short 1 per cent. grades, in the second and third notches from centre, principally the second, even with trains of 35 and 38 loaded box cars, gross weight of train (cars and freight) nearly 700 tons. The average speed is about 100 revolutions per minute. It will be seen that diagrams from those notches at 100 revolutions per minute are almost without back pressure, with the $\frac{3}{4}$ in. nozzles.

All information necessary for working up the figures is noted on them.

ENGINE NO. 1, 18x24 IN.

In view of the good results attending experiments with No. 4, this engine was taken in hand.

She had the same kind of smoke-stack, with a cone but no netting. Fire-box, same arrangement, 4 ft. 10 in. long; tubes, 182 and smaller than those of No. 4.

The exhaust nozzles were 3 in. in diameter each, and the engine did not steam well, even with the door almost closed. The brick arch, dump grate No. 2, and brick in smoke-box improved the steaming, but not enough to enlarge the nozzles. The cone was then taken out and an open pipe put in stack, 16 in. at base and 19 in. at top, about 6 ft. long. The nozzles were then increased to $\frac{3}{4}$ in. each, and I believe they can be further increased to $\frac{3}{4}$ in. each, and the engine will steam with the fire-door wide open.

The effect of an open pipe is greater in the large bonnet stack than in the diamond form. This is owing, I presume, to the larger body of air in the former that has to be started by the blast before a vacuum can be formed in the smoke-box.

Experiments with Petticoat Pipe of No. 4 Engine.—Height of exhaust nozzles above bottom of smoke-box = 12 in. (diam. $\frac{3}{4}$ in.); top half of petticoat pipe, $\frac{3}{4}$ in. below base of smoke-stack, and not moved during the experiments.

In table A the steam pressure fell during the trials from 135 to 129 lbs.

In table B the steam pressure rose gradually from 135 to 142 lbs. The vacuum was measured with a syphon gauge filled with water and attached to smoke-box.

A			B		
Diameter of Petticoat Pipe, 12 in.					
Position of petticoat pipe above bottom of smoke-box.....	No. of revolutions per minute.....	Vacuum in inches.....	Position of petticoat pipe above bottom of smoke-box.....	No. of revolutions per minute.....	Vacuum in inches.....
18 $\frac{1}{2}$	138	2	13 $\frac{1}{2}$ in.	126	1 $\frac{1}{2}$
13	144	1 $\frac{3}{4}$	12 $\frac{1}{2}$ "	139	1 $\frac{1}{2}$
12	168	1 $\frac{1}{2}$	11 $\frac{1}{2}$ "	132	1 $\frac{1}{2}$
11	180	1 $\frac{1}{2}$	10 $\frac{1}{2}$ "	150	1 $\frac{1}{2}$
10	162	1 $\frac{1}{2}$	9 $\frac{1}{2}$ "	150	1 $\frac{1}{2}$
9	168	1 $\frac{1}{2}$	8 $\frac{1}{2}$ "	150	1 $\frac{1}{2}$
8	174	1 $\frac{1}{2}$	7 $\frac{1}{2}$ "	150	1 $\frac{1}{2}$
7	170	1 $\frac{1}{2}$	6 $\frac{1}{2}$ "	150	1 $\frac{1}{2}$
6	170	1	5 $\frac{1}{2}$ "	150	1 $\frac{1}{2}$
5	170	1	4 $\frac{1}{2}$ "	156	1 $\frac{1}{2}$
4	168	$\frac{3}{4}$	3 $\frac{1}{2}$ "	144	1 $\frac{1}{2}$
3	164	$\frac{3}{4}$	2 $\frac{1}{2}$ "	144	1
			1 $\frac{1}{2}$ "	132	$\frac{3}{4}$
			$\frac{1}{2}$ "	132	$\frac{3}{4}$
			0 "	120	$\frac{3}{4}$

In each of these experiments the engine was run in first notch from centre and with the throttle valve full open. For vacuums up to $\frac{3}{4}$ inches the valve of release pressure and number of revolutions is more or less; 12 lbs. of release pressure = $\frac{1}{4}$ in. vacuum; 80 revolutions of wheel per minute = $\frac{1}{4}$ in. vacuum.

The difference in boiler pressures will account for the difference of vacuum in the two tables, with the petticoat pipe in the same notch or position above the bottom of smoke-box.

When the petticoat pipe was lowered from 13 in. to 2 in. above the bottom of box, the vacuum fell 1 in. This was tried several times.

The blower makes a vacuum of $\frac{1}{4}$ in. to 1 in.

When the above trials were made the damper and fire-door were wide open.

When the petticoat pipe is 13 in. above the bottom of smoke-box, and the box without brick in the bottom, it is hardly cleaned of cinders when working light.

Relation of Vacuum in Smoke-box to Release Pressure and Speed.—I have made the following note on the effect of release pressure and speed on the vacuum in smoke-box, and although I can't vouch for its correctness, it may assist in judging the effect of different nozzles on the vacuum in smoke-box:

For vacuums up to $\frac{3}{4}$ inches, 12 lbs. release pressure = $\frac{1}{4}$ in. vacuum; 80 revolutions per minute = $\frac{1}{4}$ in. vacuum.

For vacuums from $\frac{3}{4}$ in. to $\frac{3}{4}$ in., 9 lbs. release pressure = $\frac{1}{4}$ in. vacuum; 60 revolutions per minute = $\frac{1}{4}$ in. vacuum.

For vacuums from $\frac{3}{4}$ in. to $\frac{3}{4}$ in., 7 lbs. release pressure = $\frac{1}{4}$ in. vacuum; 60 revolutions per minute = $\frac{1}{4}$ in. vacuum.

For vacuums from $\frac{3}{4}$ in. to $\frac{3}{4}$ in., 6 lbs. release pressure = $\frac{1}{4}$ in. vacuum; 50 revolutions per minute = $\frac{1}{4}$ in. vacuum.

The effect of speed on the vacuum is much less when going slow; at 60 revolutions per minute the valve is only half that at 120 per minute.

I regret that time will not admit of my sending experiments in connection with indicator diagrams series A and B from Baldwin engines Nos. 9 and 11, but hope to send them in time for next annual meeting of the Association.

I remain meanwhile, yours very truly, JOHN E. MARTIN.

How to Run a Locomotive—The Art of Firing—Using the Regulator—How to Avoid Priming.

[From a series of papers by Michael Reynolds, London & Brighton Railway, published in *The Engineer*.]

The fire in a locomotive fire-box, to maintain steam, to consume the smoke, to burn every particle of good matter out of every shovelful of coal, requires to be made to a certain shape. In the coke days the fire did not require the same amount of attention as coal fires do now. Smoke is a nuisance, but bad as it is, sticking for steam is worse, and a "slip-slop" way of firing with coal is pre-eminently associated with both. A coal fire requires to be "worked" on account of its adhesive nature. The haycock coal fires, contemporary with failures for want of steam, are made by shovelling the coals into the centre of the fire-box; a practice as far behind the times as the use of the flint and tinder-box would be in the year 1877. The characteristics of such fires are certain as regards destruction to fire-boxes, and uncertain as regards production of steam, and the fire irons are scarcely ever at rest, hence the groove made by them in some fire-hole rings. Furthermore, such fires being chiefly in the centre of the grate, weigh down the fire-bars in the middle, until when supported at the ends only, they drop into the ash pan. It would be easy to pick out certain engines fired in this way and to prove, owing to the air being admitted up the sides of the box, that they are guilty of leaking suddenly, which must be attributed to intermittent expansion and contraction.

The shape of a fire that will make steam when all others fail will be concave, with the coals close against the plates and the centre very nearly open to the bars. Besides making steam it will not clinker. A fire made on this principle is true, and never deceives either driver or fireman. As soon as the engine starts away, and after it has given a few vigorous beats, the signs of a fire being all right are, nine times out of ten, visible. Welsh coal, however, will hang together, probably from being wetted too much, and thus prevents the engine steaming very nicely at once; the latter a matter of very great importance to a driver with 160 miles to run with one stop. The first thing to be done with such a dull fire is to get a shovelful of small coals and scatter them over the top, but chiefly along the sides, back and front of the box, and the effect will be that some portion of the coals will fall into the holes through which the box is drawing air. When the shovelful of small coals has no effect, the dart should be thrust into the centre of the fire, to open it if close, or close it if burnt hollow; but, providing a driver can see his way clear with a fire that may run for miles without increasing the pressure of the steam, which drops the moment the feed water is put on, in point of economy it should be left alone, for in time the action of the blast and the vibration of the engine will bring it round.

When the fire is right, a few puffs of steam will set the incandescent coals into a fierce flame, and steam will commence to exceed the full boiler pressure if not stopped; this is the time to commence firing on long trips, say of 160 miles. The drivers of trains running such distances have to keep time, and if it is to be done creditably, the needle of the pressure gauge must point to a full boiler of steam exactly, nothing more or less; if it is more, and the steam allowed to waste, it will be registered on the coal premium list; if it is less, they will not only lose premium money, but, by losing time. The shape of the fire is very important, as I have said, as is also the depth, but the most important feature about firing is the number of shovelfuls put on at one firing, which should be limited to six. To fire properly the fireman should stand in a position to command the coals and work the shovel without shifting his feet, turning on his heels when conveying the coals on the shovel from the tender to the fire-box. The shovel should not enter the fire-box, but stop dead on the fire door ring, discharging the coals as clean as though they were shot. There is, however, one shovelful required under the door, and the shovel must enter the box to land the coals close against the plate. The first shovelful—just what will lie on the shovel nicely—should be put in the left-hand front corner. When the knees and the body follow the shovel about the foot-plate, firing becomes fatiguing; it should be done by the muscles acting through the arms. The second shovelful should be put in the right-hand front corner. The third in the right-hand back, and the fourth in the left-hand back corner. The fifth under the brick arch close to the tube-plate, and the sixth under the door. It will be seen that the fire is made close to the plates in actual contact with the heating surface, and that the centre is self-feeding—the blast and the shocks of the road causing the lumps to fall from the sides into it. By this means the centre is composed of the finest quality of the coals, free from dirt, and open so that the air can enter without interruption in the centre, and mingling with the burning coals, becomes heated, and enters the tubes at a very high temperature, doing them no harm. Further, the box is cold-air proof. So long as air can be obtained through the grate in the centre no clinkers will form, as the abundant supply of air is capable of consuming all the earthy matter contained in coal. Similar coals have been delivered to two different drivers having the same class of engines, working the same day over the same metals, with equal average loads, and the results have been widely different; while one complained that they made clinkers, and was half afraid they would "suck some one in," the other pronounced them to be of a fair average quality, which made steam freely. The former driver put the coals in the centre of the grate, but the latter fired round the box after the manner already explained.

It is a fact that some drivers run for weeks and never clean a fire. At the completion of the trip what clinkers they have they rake back under the door, but this is a feat to be accomplished only by working in accordance with the laws which govern the combustion of coal in a locomotive fire-box.

Next to the question of how to fire, follows one of equal importance, viz., when to fire. On long trips, to effect a saving of fuel the sooner the first round of coals is put on after starting the better, as it will prevent the fire, which is generally well burnt through, from passing away into the tubes and raising steam too rapidly. There cannot be a moment more favorable for opening the fire-door to get some coals in than when steam is just lifting the safety valves; by doing so the steam is slightly checked, which saves both water and fuel. Some drivers will run twenty, or even thirty miles, before they start firing, but it is like putting ten pounds into the bank on Monday and drawing nine pounds ten out on Tuesday. A good starting fire represents so much capital, which should never be touched on a 160 mile trip until 120 miles have been covered. Then the shovel may be set aside, but not until then. The interval between the start and each round of firing is regulated by the weight of the train, the state of the weather and the time allowed to run the trip, together with the quality of the coal; but however much these may vary, one thing will remain constant and certain, and that is the fire, to maintain its efficiency, must retain its concave shape throughout the trip; the coals require to be put into the very place they are intended for when picked up by the shovel, and not dropped in at the door and allowed to "wander." The secret how to obtain and hold a respectable position on the coal-saving list is, fire with few coals and often, round the box. Notwithstanding the different plans which have been invented to effect the perfect combustion of smoke, the best plan yet found is to employ a willing and persevering fireman, who puts both heart and soul into the work; the shovel is seldom out of his hand, after he has once commenced to fire, until he finds he has sufficient in the box to finish the trip with. The practice, however, is in many instances to put too much into the fire-box at once, which is followed by all sorts of things, viz., clinkers, slow traveling, tubes leaking and hot smoke-box doors.

When to fire: Locomotive firing should be done with the steam on. What an unsightly thing it is to see an engine entering a station with the driver at the brake, the blower hissing loud, and the fireman shoveling coals on the fire. Undoubtedly this is not in accordance with first-class practice. In preference to the above, when firing is required it should be put on between stations, and away from signals, and some two or three miles before the regulator is going to be closed, so that the air can have an opportunity of getting through the fresh coals, and thereby assisting to keep down the smoke without the use of the blower. When the firing is done with the steam on, the driver can give his eye for a moment to the fireman's actions, and see that every lump of coal finds its proper billet, and then when the train enters the station both are attending to their respective duties. When the firing is done with the steam on, the coals do not choke up the grate through which the iron steed draws his breath, the foot-plate is kept free from smoke and sulphur, and the blower can almost be dispensed with. When firing on long runs the most favorable spots and gradients for working the shovel should be selected and habitually used. The grand aim of first-class firemen is to keep the boiler at an even temperature, from the start of the finish, up hill and down dale. To do this, and it is accomplished every day, the opportunities for opening the fire-door should be seized. For instance, it should be opened the moment steam commences to waste from the safety-valves; and this occurs frequently, freely where little notice is taken of it, and that is when ascending an incline, when generally the fire-door is open to check the steam. The fire-door should never be opened except for firing, and the steam is controlled, to all intents and purposes, best through the dampers. When the wind is blowing hard, advantage is taken of the cuttings and places where the line is well protected by trees to prevent the coals being carried off the shovel. To avoid a choked fire—that is, one so thick as to prevent the air entering the fire-box through the grate—two things are to be kept in mind, viz., to keep the two back corners well up, so that the fire tapers towards the tube plate, and to keep the fire-irons on the tender. Firing, when done by the shovel alone, is one of the strongest evidences we can find, in connection with a fireman's duties, of a man working his mind as well as his muscles; and whether on goods or passenger engines, the value and rank of every man will be in proportion to the mental labor exerted with each manual task.

When the engine is running the train the regulator should never be shut to pull the link up. The practice, especially with an engine having a worn motion and play in the driving journals, is liable to break an engine down. It also inflicts a severe tensile strain upon the couplings, and is apt, when the steam is suddenly put on, to part the train. It is a remarkable fact that engineers who habitually close the regulator to notch their engines up, come to grief, nine times out of ten, while in the act of doing so. The answer to the question, "Where did this take place?" has been again and again, "Just starting away from the station." Here piston-rods have snapped off out of the solid; and piston-heads, made, one would think, never to break, have succumbed to the blow given them by the steam turned full and suddenly upon them. The distance traversed from the station before commencing to "notch up" depends upon the load, gradient, weather, and time allowed to run the trip in; but although circumstances will alter cases, yet there is one thing in connection with this part of a locomotive engineer's duties that will remain constant, no matter what engine he has, and that is, after the train has attained a pretty good speed, the reversing lever or wheel should be used to notch up by degrees, and not pulled up almost out of gear at once. A few clear, sonorous puffs at the start not only prove whether the fitter has lined the big end brasses up so that the piston-head strikes the cylinder cover, but they prove also whether the fireman has put the coals on so that the fire-box is cold air-tight; and, further, they clear the tubes of loose cinders or soot which may, possibly, have been left in them by the tube sweeper. It is cruel not to give the noble iron horse a little grace against time, to afford him an opportunity of shaking the cold and stiffness out of his limbs. To get away well without lifting the water out of the boiler into the cylinders is a very desirable attainment, because half a pint of boiling water will as effectually wash the lubrication off the face of the valves and cylinders as it will the grease off plates and dishes. Priming, in most instances, is either due to the fault of the driver or the fireman; but to avoid priming on the road, and at the same time to carry a glass full of water, two things are absolutely necessary—viz., the steam must be maintained at the maximum boiler pressure, and it must be admitted to the cylinder, as far as possible, at the same pressure. The first concerns the fireman, and the second the driver. It is well known when an engine is allowed to slip much priming frequently follows, caused through the difference of steam pressure in the boiler and cylinders. When this takes place in conjunction with high speed, the steam in the boiler, as it suddenly rises from the water, carries off with it large quantities of water. Now this difference of pressure in the two chambers, boiler and cylinder, while the engine is being supplied with steam, cannot, for obvious reasons, be absolutely extinguished, but its minimum is attainable by working with the regulator open, and expanding the steam through the links and reversing gear. The higher the pressure of the steam in the valve chest, the shorter is the period of admission possible, without reducing the tractive power of the engine. Further, the pressure in the cylinder, during the time the

valve is open, rises as the period of admission is shortened. Upon every foot-plate we find one of the three following methods employed by drivers for getting along the road: Driver A, indifferent to the elasticity of the steam as a power, does not insist on the fireman keeping the steam up to the maximum boiler pressure—which is to say 140 lbs. to the square inch—he gets along and keeps time with the regulator open and the reversing lever in the third or fourth notch. Driver B likes a “boiler full of steam”—140 lbs.—but works his engine with the regulator—that is, wire-draws the steam—and, like A, sets the reversing lever in the third or fourth notch. Driver C carries also a full boiler of steam, like B, but works his engine with the regulator open, and expands the steam in the cylinder by notching up as near out of gear as the load will allow, until the exhaust steam sometimes can scarcely climb out of the chimney.

President Scott's Address to the Employees of the Pennsylvania Railroad Company.

President Scott has transmitted the resolution of the board of the Pennsylvania Railroad Company, thanking the employees for their fidelity during the late strike, with the following address:

PRESIDENT'S OFFICE, Aug. 4, 1877.
To all the Loyal Employees of the Pennsylvania Railroad Company:

It gives me great pleasure to transmit to you the following preamble and resolution of the Board of Directors of this company, thanking you for the manner in which you withstood intimidation and violence, and thereby greatly aided the lawful authorities in restoring the use of the highways controlled by it to the business of the public and the commerce of the country. Allow me to call your attention to the fact that during the entire history of this company, extending over a period of more than 30 years, its management has always considered the contentment and well-being of the men in its service of the greatest importance; and it has always felt able to challenge comparison, both as to rate of compensation and care for the personal comfort of its employees, with any other employer of labor in the country. It has always given a prompt hearing to any complaint, and I can safely say that no employee or committee of employees of the company has ever been denied by me a respectful consideration of any alleged grievance.

I ought also to say to you, in the frankest manner, that the recent reduction of compensation was a necessity growing out of the depressed condition of all business interests, and was adopted not before, but after, every means had been taken in other directions to avoid it. For the last four years the management of this company has been strenuous and earnest in seeking to secure the best revenues possible under the existing condition of business, and to diminish its expenditures in every legitimate manner, so as to leave to you satisfactory compensation for your labor and to the owners of the property a fair interest upon their investment. The reduction of dividends to shareholders has been more than twice as great as the reduction of your compensation.

The causes that led to the reduction made on the 1st of June were fully explained to a large committee, known as the General Grievance Committee of Engineers and Firemen, employed on the Pennsylvania road and leased lines east of Pittsburgh, who conferred with me on the 4th of June last. After a full interchange of views, the committee advised me in their letter of that date that “as the business of the country was so depressed in all its various branches, they believed it the duty of the engineers and firemen to cheerfully co-operate in advancing the best interests of the company.” They were, therefore, entirely satisfied that the company had simply done what was right and proper under the circumstances, and were ready to stand by its management in the action that had been taken, hoping that when the country became more prosperous their wages would be restored to the old standard.

I do not believe that the lawless work of violent men, which has so seriously deranged all business relations for the past two weeks, can long postpone the return of that obedience to law which is essential to every man in the service of the company. Only through the preservation of law and order can the families and homes of the men, and the men themselves, be afforded that full protection to which all good citizens are equally entitled.

I desire to impress upon every thinking man in the service the great injustice that has been done by the attempt to enforce a strike such as was inaugurated July 19, without so much as a proposition for a conference with any officer of the company. I believe that if a proper opportunity had been offered for a conference, the parties disposed to engage in such an effort could have been entirely satisfied as to the necessity of the action taken by this company, or if it could have been shown that there were peculiar hardships, they could have been remedied without resorting to such lawless acts as have brought disgrace upon our whole country.

No alternative was left to this company, when its trains and business of the public had been interfered with, but to ask the proper authorities in the various localities to suppress disorder and enforce the law, whereby its property would be protected and restored to the possession of its owners. To-day I feel at liberty to congratulate you upon the virtual attainment of that result, in so far that the railways of the company have been opened to the public and its property restored, except where it had been destroyed by mob violence, and beg to thank you heartily for your loyal steadfastness to the best interests of the company, which are also your own best interests.

I trust, after the experience of the past few weeks, every man in the service will feel it his duty, as well as his pleasure, if he has a grievance, to present it to the proper officers for consideration, and that hereafter the works of this company will be protected from all violence. Your interests are identical with, and inseparable from, those of the company. As you now share in the adversity consequent upon the universal depression and stagnation of business, you will be equally sure to share in the prosperity which I confidently believe awaits the company and the general business interests of the country in the early future. Very respectfully,

THOMAS A. SCOTT, President.

Following is the resolution of thanks to the employees:
Whereas, The railways and other property of the company during the past two weeks have been subjected to strikes and mob violence unparalleled in the history of this country, resulting in a deplorable loss of life and in a great destruction of property and the general suspension of business; and

Whereas, At least 90 per cent. of the employees in the service of the company have remained faithful to their duties, notwithstanding the intimidation and threats of violence to which they were subjected by a mob composed mainly of men in no way connected with railway service; therefore, be it

Resolved, That the Board of Directors hereby tender the thanks of the company to all the men in its service who through the scenes of lawlessness which have occurred within the past two weeks remained firm and ready to discharge their duties, and who have thus recognized and fulfilled the obligation resting upon all good citizens to sustain the law, and have maintained their own right to labor for the support of their families, free from interference or intimidation.

—It is reported that Mr. J. Q. A. Bean, General Freight Agent of the Michigan Central, has tendered his resignation on account of ill health.

Contributions.

Regulations for Railroad Paymasters

[From a forthcoming work entitled “Railway Revenue and its Collection,” soon to be published.]

The safe custody and honest disbursement of large sums of money require qualities of the highest order. Association and habit have much to do with the formation of these desirable qualities. A man of moderate desires, long habituated to the sight and presence of money not his own, comes in time to look upon it simply as a medium necessary in the adjustment of certain balances; it ceases to be money to him. He receives and disburses millions with no other thought than as to the legality of the transaction: at the same time he is perhaps greatly harassed and perplexed over some trifling personal outlay he must make. It is, as a rule, the new and inexperienced man who fails to comprehend the sacred character of the trust confided to him, and he succumbs and is lost while yet he is arguing that his actions are right and proper.

In view of these evident truths it is apparent that in selecting men for positions of financial trust, preference should be given to those who have served an honorable apprenticeship in the very field in which they are called to act; who by long association and discipline have become familiar with all the peculiar phases of the position to be filled.

The position of Paymaster upon a railroad is one of great importance; its duties are such as to require fidelity and good judgment. The Paymaster must be accurate and quick in the performance of his duties; he must at all times be firm in adhering to the rules and regulations necessary to protect himself and his employers; he must be ever on the alert to protect his company against petty deceptions, well-executed frauds and surprises of every character; he must be a man of physical courage; he is required to be courteous in his manners and patient and considerate in his intercourse with the subordinate operatives of the road with whom he is constantly brought in contact; his associates and manner of life must be such as to secure the respect and confidence of his employers; his habits must be sober and well regulated, and his wants such as come well within the scope of his salary.

The duty of paying men separated by considerable distances and worked under different rules and superintended by distinct departments is one of great responsibility, and oftentimes one of harassing perplexity.

The dangers are considerable and peculiar, and the liability to pecuniary loss constant.

The facilities afforded by the pay cars are at the best inadequate, and the greatest vigilance and skill are required to act rapidly and, at the same time, accurately.

The time in which it is possible to pay railway employees is greatly restricted, the first half of the month succeeding that for which the wages are due being occupied in examining the pay-rolls, and auditing the paymasters' accounts for the preceding month.

The rules, therefore, must be direct and simple, and the discipline of the department, at all times, rigidly enforced.

It is only upon the very largest roads that more than one paymaster will be required.

To promote a proper *esprit de corps* in the force, and to ensure the necessary harmony and simplicity in the business of paying the force, the following rules and regulations should govern the purposes of the department:

The pay cars should always be treated as business offices of the company; never as perquisites of the officials of the pay department; nor as waiting rooms or lounging places.

Smoking and similar practices should not be permitted in the cars during office hours.

Cards should neither be played nor tolerated in the pay cars.

The cars and their furniture and fixtures should be kept clean and orderly.

The same decorum and exclusiveness should be observable in them that is characteristic of a well-organized bank.

In many respects their trusts are quite as important as those of our banks.

Passengers are not to be transported, neither those who pay, nor those who ride as invited guests.

If it is desired to extend the courtesies of the road to a family or others entitled to such favors, passes should be procured, and they should be used on the regular trains.

The presence of people not connected with the car distracts the attention of the paymasters and their clerks, and renders errors more likely to occur.

The papers and records of the cars should be kept written up and carefully filed from day to day, so that in the event of sickness or accident to any or all of the *attaches* of the cars, the work could be clearly and intelligently taken up and carried forward by new men.

No one is to have access to the pay-rolls of the company except those whose official duties require it. The salary received by each official or employee is a personal matter between such official or employee and the company, and one that in no way properly interests or concerns others. The information that the pay-roll contains should, therefore, be treated at all times as confidential.

An impression must, in each and every case, be taken in the copy books of all letters, telegrams, statements, etc., emanating from the paymasters.

All records and papers must be carefully and systematically filed, monthly, in the Local Treasurer's vault, for reference and the due protection of the company.

It is the duty of the paymasters to exercise a constant vigilance, to detect errors, duplications and irregularities of every conceivable nature in the pay-rolls, notifying them promptly by letter to the proper department or heads of service. In furtherance of this end they can, at all times, call for such explanations, or enforce such checks and regulations, as they may think necessary, or the necessities of the service demand.

The footings and extensions of the pay-rolls must be carefully examined by paymasters before they commence paying, and a certificate that such examination has been made must be attached to each roll. A formal notice must be sent to the Local Treasurer of all errors discovered.

While on the road, no one who is not an officer of the company, except the conductor and guard, will be admitted within the office part of the car; the office part of the car must always be kept locked, and the outer doors of the car must also be locked, except when actually engaged in paying men.

The paymasters and attendants are required, at all times, both day and night, and when accidents occur, to adopt every possible precaution to prevent the surprise or forcible entrance of their cars by robbers, and they will be held responsible if they do not use such precaution.

The burglar-proof safe and the steel chest inclosed, with which each car is provided, must always be kept locked and the “combination” destroyed. The “combination” must be known to no one but the Paymaster.

Only small amounts of money, needed in paying from station to station, will be kept in the sub-safe or money drawer. The time lock on the safe in which the bulk of the money is contained should be set so that in the event of any accident ample time would transpire for the alarm to spread before the safe could be opened.

The paymasters and their assistants, including the conductor and guard, are expected to become experts in the handling and practical use of the fire-arms in their possession, and, in the defense of their trust, they must everywhere, and at all times, be prepared to use such fire-arms to the death.

The paymasters are authorized to call upon division superintendents for such guards, in addition to the conductor and the ordinary guard, as they may think proper, and the paymasters are further authorized to summarily reject, without giving any reason therefor, any employee detailed to act in connection with the pay train.

The engineer of the pay train should be effectively armed.

The guards detailed to act will be armed and drilled by the Paymaster or his assistant.

For the protection of the car, each Paymaster is required to have on hand, ready for instantaneous use, eight revolvers, three double-barreled shot guns, two Winchester rifles, two cutlasses, and such other instruments or means of defense as would seem to be of value in preventing or repelling an attack.

The carrying of large sums of money through the streets by persons so generally known as are the *attaches* of our pay cars is particularly hazardous. They should, therefore, accompany each other to and from the banks and express offices, each man being always armed and on his guard.

A distinct or private guard should also be employed upon such occasions. Never, under any circumstances, is a Paymaster or his clerk to perform such a service alone, no matter how insignificant the amount of money may be. The appearance of a Paymaster or clerk, going to or from the car with a bag or box, would naturally be a signal to those in waiting to commit robbery.

It may be accepted as true that, as a rule, long familiarity with the presence and custody of large sums of money (especially the custody of money apparently secure) tends naturally to make the custodian, if not negligent, at least less and less watchful of his trust. Paymasters must therefore carefully guard against a habit leading to results so unfortunate to them and so disastrous to the company.

Constant vigilance upon the part of the paying force is the only guarantee of safety.

When on the road watchmen should patrol the car at night (the usual attendants and guard occupying the car), and great care should always be exercised in selecting as secure a place as possible for the car to rest.

The paymasters possess at all times and in all places arbitrary authority and discretion to act, in so far as may seem to them to be necessary to protect the funds intrusted to their care.

In the discretion of the Paymaster, the pay car, when attached to a passenger train, should be fastened to the preceding car by chain and lock, in addition to the usual coupling.

Before beginning to pay, the paymasters will report to the Local Treasurer where they expect to be each night during the trip. Should the programme so laid out miscarry in any respect they will advise the Local Treasurer by letter. Should any accident befall the car or its attendants while on the road the Paymaster will promptly advise the Local Treasurer of the fact by telegraph.

The paymasters will keep their immediate superior, the Local Treasurer, advised, at all times, of everything relating to their respective accounts, the business intrusted to them, and its wants.

No payments will be made by paymasters for or on account of the company, or for any other purpose, except upon accounts duly authorized and approved by the proper officers.

At the close of each month, or upon the return of the paymasters from paying the force on the road, they will at once make up their several accounts and forthwith turn the same over to the Auditor, to be examined and passed upon by him.

The cash and vouchers (time tickets, etc.) making up the balances due from the paymasters must also be turned over to the Auditor, at the same time, to be carefully and minutely examined by him, the vouchers being stamped “audited.”

At the time the accounts are passed upon by the Auditor, the pay rolls proper for the current month will be turned over to him to be filed away.

Before depositing the rolls with the Auditor, the paymasters will make “remainder rolls,” embracing the names and other particulars of all employees remaining unpaid at the time the accounts for the month are passed upon by the Auditor.

The remainder rolls (one for each paymaster) must be verified by the Auditor.

Afterwards, as the names appearing upon the remainder

rolls are paid, the Auditor is required to attest that the paymasters have been allowed credit for such payments.

The paymasters will procure from the Local Treasurer, each month, statements of their accounts as the same stand on the general books of the company, arrived at in the following manner, viz.:

When the examination of the paymasters' accounts are completed, a statement of the payments made by each Paymaster is certified to the Local Treasurer by the Auditor.

The amounts of these statements are then credited to the respective paymasters, unpaid rolls being charged.

All cash paid to the paymasters by the Local Treasurer is charged up at the time it is paid.

The difference between the disbursements of paymasters and the amount paid them by the Local Treasurer, added to the amount on hand at the commencement of the month, represents the amount of cash which the paymasters should have on hand to balance their accounts.

The balance of the paymasters' accounts, made up as explained above, should be ascertained each month by the Auditor, as the final evidence that the accounts of the paymasters are correct.

All time tickets paid by the Local Treasurer will be turned over as cash to the paymasters before the latter commence the payment of the rolls each month.

Before commencing to pay each month, all time tickets and orders paid by the paymasters or Local Treasurer for the preceding month must be carefully checked with the pay-rolls, and the latter duly written up. The boarding-house and other accounts must also be arranged preparatory to paying the rolls. All checking and accounting must be done before commencing to pay in fact, so that the paymasters and their clerks may be left, so far as possible, free from all perplexities, and with nothing to do while on the road but to scrutinize the pay-rolls and watch unceasingly over the company's money in their possession.

All time tickets, orders and other papers cashed by the paymasters must be stamped "Paid" by them at the time of payment. The stamp should also give the date of payment and name of paymaster.

In all cases when the clerk is not present to sign and witness payment, the payee must receipt personally on the roll for whatever money he may receive.

Money must never, in any case, be paid out without its being properly witnessed or receipted in due form on the roll at the time of the transaction.

At the shops and elsewhere, when the pay-roll is called and witnessed by some other person than the paymaster's clerk, the paymaster's clerk must, nevertheless, look over the roll as it is being called and witnessed, to see that no error or omission occurs.

Whenever paymasters are not positive as to the identity of persons claiming to have wages due them, they will require that the party be identified by some responsible person.

In all cases where it is necessary to have the payee identified, the name of the person identifying such payee should be inserted in the roll; as already explained, conductors and foremen should be present when the men employed under them are paid; when they are not present it is of especial importance that a record should be kept of the person who identifies the payee.

It is expected and desired that all employees of the company will appear personally before the Paymaster and draw their wages, and paymasters will discountenance the practice of giving orders, except for good and substantial reasons.

The appearance of the men personally before the paymasters is a partial verification of the authenticity of the rolls.

No one in the employ of the company is permitted to discount the pay of an employee or to traffic in orders drawn on the Paymaster.

The possession or authenticity of an order must be explained to the perfect satisfaction of the Paymaster before he will pay the same.

Orders on the Paymaster are not to be considered negotiable paper, or paper which the company guarantee or is in any way responsible for. Orders are to be countersigned only by the paymasters, and then only after the pay-roll has been marked opposite the person's name "order given," inserting date and witness.

Whenever the pay car is to arrive or depart from a place before or after business hours (and, as a rule, no payments should be made except during regular working hours), notice must be sent ahead by telegraph or otherwise, so that the men can be on hand to get their pay.

It is desired that every man on the roll should get his pay at the proper time and place.

To curtail expenses as much as possible and expedite business, all payments should be made on the outward-bound trip, no payments whatever being made on the return trip, drafts being sent, upon request, to such employees as were absent or did not get their pay at the regular time.

All payments not made in the car directly to the payee must be made by the usual form of draft provided, except where the party would clearly be unable to get draft cashed by the agent or at the country stores. In the latter case the money, with a pay-roll properly filled out, must be sent by express to the agent of the company; each payee must sign his name or mark opposite the amount due him, and the agent, as such, must witness each payment.

When payment is made by draft, the number and date of said draft must be entered opposite the employee's name. The roll must also be dated, and witnessed by the clerk.

The drafts given by paymasters must be arranged in numerical order and filed together with other papers in the Local Treasurer's vault.

In paying at the shops, and wherever there are gangs of men, the paymaster will have the men approach the window for their pay, in single file, and also, at the shops, in alphabetical order.

The gang foreman must be required to be present while the men under his charge are being paid. He should stand outside the office, beside the paying window, where he can identify his men and keep them in order.

It is the duty of the paymasters to enforce order and decorum in the payment of the force. This can be secured through the heads of service, foremen, and others.

The foregoing rules in reference to the enforcement of order on the part of the men are right and proper, on the principle that a shiftless and slovenly style of doing business is not becoming or tolerable in or about an office of such great responsibility.

Paymasters will notify the division superintendents, in writing, of each and every error or omission in making out the pay-rolls for their respective divisions.

Errors in the shop rolls will be reported, in writing, to the Local Treasurer, and it is his duty to correspond with the clerks in reference to such errors.

The pay cars when at the general office must be kept open from 9:30 a. m. to 4 p. m., and open for general business from 10 a. m. to 3 p. m.

Paymasters are required to file such bond and for such amount as the Local Treasurer may direct.

PLAN FOR PAYING RAILROAD EMPLOYEES BY DRAFT.

Upon railway lines running through a generally populous and wealthy country, the payment of the force directly from the general office by draft may afford an economical and, in many respects, advantageous substitute for the more cumbersome practice of paying the men from the car.

The material thing to be considered is, can the employees get their checks or drafts cashed without considerable trouble and annoyance? This inquiry being answered in the affirmative, then the plan of paying by draft, if properly systematized, possesses advantages that should give it the preference over the heavy and expensive system of direct payment to the men through the agency of the pay car.

Some of the merits possessed by this system may be enumerated as follows:

1st. It affords absolute protection against over-payments or loss from any other source.

2d. The responsibility of the banks upon which the drafts are drawn compels them to insist upon such responsible identity for all endorsements on the back of the checks as to render the insertion of fictitious or fraudulent names on the pay-roll a matter fraught with great danger, if not practically impossible.

3d. The pay rolls would never leave the general office, and with the exception of the brief time during which checks were being drawn for the several rolls in their order, and the accounts being audited, the rolls would be available at all times for purposes of minute and careful examination and criticism by the officers of the company responsible for the economical working of the property.

4th. Under the plan of paying through the medium of the pay cars, it is as a rule necessary to hurry the rolls through the different offices, and other duties frequently preclude even a glance over them by the general officers, a comparison with other months being the most that can be accomplished; and this information is generally rendered practically worthless, as there is no conclusive or concurrent evidence in regard to the months compared with.

5th. The cost of paying the rolls by draft would not exceed fifty per cent. of the cost of paying the currency to the operatives personally.

The Paymaster and his assistant would still be required; but the expenses of the train employees and guard, the cost of fuel, oil, waste and tallow used on the engines and cars, the wear and tear of equipment and track, the value of the machinery required to perform the service, the interruption of business consequent upon the running of the pay trains and the loss of time by employees would all be obviated under the system of paying the men by check.

In paying the rolls by check, the checks should be sent to the shops and agents of the company for distribution, say on the 25th of each month.

The money to pay the same should be credited up to the bank from day to day as it accumulates, commencing, say, on the 7th of the month. The effect would be to leave a large balance in the bank undisturbed and on which it could rely up to say, the 27th, and the great bulk of it until the 31st. An insignificant rate of interest on this balance would reimburse all the outlay incurred in paying the rolls, so that the actual saving in the cost of paying would really be much greater than the amount suggested above.

The checks should be made payable at some commercial centre common to the district to be paid. They would then become a convenient, safe, and favorite medium of exchange for merchants and others, who would otherwise be put to some little expense in making their remittances.

In introducing the plan of paying by check, care should be taken to make plain to the men the *modus operandi* of realizing upon the drafts in their possession, so that all the requirements of the law may be satisfied.

Agents should be directed to cash the checks whenever the funds in their hands will admit of their doing so, in manner somewhat as follows:

1st. On presentation of a check duly signed and countersigned, agents will pay the cash for the full amount of the same to the payee (i. e., the party in whose favor the check is drawn), if the said check is presented by him, and if he is personally known to the agent to whom he presents it, upon his writing his name across the back of it, i. e., endorsing it.

2d. If the payee is not personally known to agents he must be identified by some responsible party, and agents will cause said party to certify to the genuineness of the endorsement of the payee by writing "certified to" and signing his name immediately below.

3d. If the payee cannot write, agents will cause his endorsement

ment by his cross (+) to be duly witnessed, in legal form, by some responsible and disinterested party personally knowing him, in manner and style as follows, viz.:

Witness,
RICHARD ROE.
his
JOHN + DOZ.
mark.

4th. No check will be paid by agents until they have satisfied themselves of the genuineness of the endorsement of the payee.

5th. All checks paid by agents they will at once endorse, and send the same forward as cash in their daily remittance.

6th. In the event that the day's receipts of a station are not sufficient to pay the checks presented, the agent will, whenever called upon, render all the aid and information in his power to facilitate employees of the company in the procurement of the cash for their checks, explaining that the checks will be paid on presentation at the bank, and will be accepted by banks and express companies, and should be cashed at their face by merchants and others for all debts due them by employees.

7th. The foregoing instructions should be securely posted in a conspicuous place at the station and shop buildings.

All checks remaining uncalled for at the expiration of thirty days should be returned to the Local Treasurer.

The following should be inserted in the body of the draft used in paying the force, directly after the amount, for the purpose of making the instrument a perfect receipt to the company:

Being the amount due him in full for services of every name and nature for the Blank Railway Company for

18.
The indorsement of the payee on the back of this draft is a receipt in full to the railway company specified above for the claim named herein.

The foregoing form of paying would make the labor extremely simple and expeditious.

The pay-roll blank, when the same is paid by draft, should be especially arranged for the purpose.

The columns should give:

- 1st. The occupation of the employee;
- 2d. Name;
- 3d. Point to which check for wages should be sent.
- 4th. Time worked.
- 5th. Rate.
- 6th. Amount of wages.
- 7th. Amount to be deducted, and why.
- 8th. Net amount due.
- 9th. Paid by check number.
- 10th. Auditor's certificate.

The Basis of Payment for Use of Foreign Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been deeply interested in the different articles published in the *Gazette* during the past season regarding mileage of freight cars, the proper manner of keeping the record and settling for the same, and I consider it one of the most important subjects now attracting the attention of railway officials. It occurs to me that a better plan can be devised than that now in vogue—of paying for cars upon a mileage basis—and I would suggest in its stead the adoption of a fixed charge per day for each day cars are detained away from their own road, making this charge directly against the road receiving such car, and requiring all cars to be returned at points delivered, excepting cars belonging to regular through lines, in which both roads were interested. A charge of fifty cents per day would afford a reasonable return to owners of cars, and would not be burdensome to companies compelled to use foreign cars; it would certainly lead to greater promptness in handling such cars and compel all lines to give this branch of their business close and careful attention. Under the present mileage system, all of the smaller and poorly equipped roads are a constant drain upon the rolling stock of trunk lines they connect with, partly by the natural exchange of business, and partly to accommodate local traffic on the lesser line, and this without any adequate or reasonable return for the service: For example, a local car belonging to one of these unfortunate lines is loaded and allowed to run through over some main route, and is promptly unloaded and returned, earning, in many instances to my knowledge, from two to three dollars per day in mileage. On the other hand, a car goes from this main or trunk line to some of its weakly connections. The facilities for handling and storing freight being very imperfect, the car may be held for return load, or in local service, and when returned possibly credit is obtained for one or two hundred miles run in from ten to twenty days. This perhaps is an exaggerated case, still the evil exists in different degrees on all lines of road. Under the proposed plan any company delivering a car to a connecting road would require its return at the same point, and would only look to the immediate connecting road for their service of fifty cents per day, no matter how many different lines had used the car. I judge fifty cents per day would be a fair and reasonable figure, still it might be expedient to fix upon a smaller sum. This plan would offer greater advantages, of course, to well equipped roads, which are in the habit of furnishing rolling stock extensively to their poorer neighbors; it would be objectionable again to some roads which depend largely upon mileage accounts for their income. Will some of your many readers express their views upon this subject and name such points for or against as may occur to them?

K. H. W.

—Mr. S. Sprigg Belt, a director of the Canton Company and of the Union Railroad Company, of Baltimore, was found dead under a tree on his farm near Owings' Mills, Md., Aug. 2, having been killed by the discharge of a shot gun. It is uncertain whether the gun was accidentally discharged, or whether he had committed suicide. Mr. Belt has been in poor health for some months, and was known to have lost heavily in some recent stock speculations.



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Editorial Announcements.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

FUEL ECONOMY.

Notwithstanding all that has been written and the numberless experiments which have been made on the consumption of fuel in locomotives, it is safe to say that in the minds of those who have the practical supervision of the motive power on railroads this subject is still involved in a good deal of mist, or perhaps we should say smoke, which would be literally true. The subject is in fact a very complicated one, and has the peculiarity, which is characteristic of many chemical processes, that the relative proportions which the different elements in it bear to each other produce changes not only in degree but often in the kind of results attained. Thus if any one asked what the chemical composition of the ordinary atmosphere is and was told that it is composed of nitrogen and oxygen, and if he should then mix 14 parts of nitrogen with 8 of oxygen he might be surprised that, instead of being air, this combination made laughing gas, and if the mixture was in the proportion of 14 parts of nitrogen to 40 of oxygen, that it made nitric acid or aqua fortis. Now in these cases the relative proportions not only produce results differing in degree but, at least so far as our senses are affected thereby, they seem to have entirely different natures. Now in the process of combustion this effect of relative proportions applies not only to the chemical elements which enter into the process, but also to such things as the time and temperature employed, and the relation of the size of the parts of the grate, boiler, etc. To illustrate this, reference may be made to the fact that nearly all persons who have anything to do with the practical management of steam boilers know that in order to sustain combustion a supply of air is needed. It was also shown some years ago, in the writings of Mr. C. Wye Williams and others, that the admission of air to a fire above the grate is sometimes beneficial. Acting upon this partial knowledge, apertures have been made in the sides of locomotive fire-boxes and in the furnace doors, and air passages have been carried from the front end of engines, through the tubes, to admit air in this way to the fire. Now, it is not asserted of any of these expedients that they may not be beneficial, but it can be said, without hesitation, that in many cases they have done greater harm than

good, for the reason that the amount of air introduced has not been in the right proportion, or of the proper temperature, or admitted at the proper time. In the process of combustion, especially in locomotives where the rate at which it is maintained varies so much, it is of the most vital importance that all the components of the process should bear the proper proportion to each other. That which, if applied in the proper proportion, would produce a favorable result may cause just the reverse if the right relation is not maintained.

To illustrate this still further, it may be stated that it takes about 150 cubic feet of air to consume a pound of coal. The temperature of combustion, if just enough air is supplied to produce perfect combustion of the fuel, is about 4,640° F., and the volume of the gaseous products at that temperature would be 1,551 cubic feet for every pound of coal burned. If, however, twice the quantity of air necessary to produce perfect combustion is admitted to the fire, then the temperature will be lowered to about 2,500°, and the volume increased to 1,812 cubic feet. In other words, we have an increased volume of the products of combustion, but of a lower temperature. As the transmission of heat is in proportion to the difference in temperature between the products of combustion and the surfaces with which they come in contact, therefore, if their temperature is reduced, the amount of heat transmitted to the heating surfaces, in a given time, will be less than if their temperature is high. But as their volume is greater, if more air is introduced than is needed for perfect combustion, with a given rate of combustion they must pass through the tubes more rapidly than would be necessary if their volume was smaller. If therefore more air is admitted to the fire than is needed to produce perfect combustion, we have a condition of things in which not only is less heat transmitted to the heating surfaces in a given time, but, in order to promote a certain rate of combustion, there will be less time for the transmission to take place. We therefore lose in two ways, and consequently it will be seen how important it is that just enough air should be admitted to effect as perfect a combustion as possible. Unfortunately, with the appliances which are now used for burning coal in locomotives it is impossible to carry on the process of combustion with any degree of exactness. All that can be done is to produce as close an approximation to perfect combustion as possible, on the one hand, and to admit as little air as possible in excess of that required to maintain such combustion.

Now, another fact must be kept in mind, which is that combustion only takes place at the surface of fuel. For this reason careful firemen break up their coal into small lumps, so as to expose as much surface as is practicable. The fact, however, that much bituminous coal is reduced to a sort of semi-plastic condition and "cakes" when heated increases the difficulty of burning it. For these reasons Mr. Crampton in England and Messrs. Whelpley & Storer in this country have reduced coal to a fine powder and blown it into the fire with a current of air, and thus every particle of coal is surrounded with air and perfect combustion takes place. Mr. Siemens, in his furnaces employed for metallurgical purposes, converts the coal into a gas and burns the gas. Neither of these plans has, however, yet been successfully applied to locomotives. The plan invented by Watt has, however, been much used in stationary and also in locomotive boilers. This was a dead-plate, or a plate without perforations, which was placed in the furnace, "on which," to quote the language of Rankine, "each fresh charge of coal is laid, until the hydro-carbons are volatilized and expelled by the radiant heat of the fire. The layer of burning fuel on the grate being thin at the time when a fresh charge is needed, more air passes through it from the ash pit than is necessary for its own combustion, and the surplus serves to burn the inflammable gas as it passes above the grate. When the coal on the dead-plate has been reduced to coke, it is spread over the grate."

It may be explained here that when a shovelful of bituminous coal is thrown upon a fire, what occurs is that, as the coal becomes heated, the hydro-carbon gases, similar to ordinary illuminating gas, are expelled, and if mixed with the requisite quantity of air, at a sufficiently high temperature, they will be burned. But if a quantity of fresh coal is thrown on the grates, it is evident that, owing to the irregular manner in which it falls on the grates and the caking of the coal from the heat, the amount of space or the openings through the coal for the passage of air must be a matter of great uncertainty and irregularity. Besides, as the coal becomes heated so that the gases are volatilized or expelled, it begins to swell or cake, so as, to a great extent, to close the passages for the admission of air through it; and therefore, it will be seen, that at the very moment when and at the places where the gases are generated and a supply of air needed for their combustion it is to a greater or less extent shut off, whereas at other places on the grate, where the coal is not yet heated, or where all the gases have been expelled, there may be too much air admitted. After all the gases are expelled from the coal it is converted into

coke, which may be called a dry, spongy substance, composed of almost pure carbon. This does not cake as fresh coal does, and therefore when a grate is covered with a layer of coke the admission of air through it can be regulated with much greater exactness than it can through a layer of raw coal. Not only can enough air be admitted through the coke for its own perfect combustion, but a surplus may be admitted to the fire-box through the layer of coke which, if in an incandescent state, will heat the surplus air which passes through it to a high temperature. If then the fire should be so managed that the grate was covered with a layer of incandescent coke of about the right depth, and if at the same time the raw coal was placed on dead plates, so that the gases were volatilized, it is evident that they would be perfectly consumed in the fire-box, if there was a sufficient supply of air admitted through the layer of coke on the grate. As this air would be heated to a high temperature by passing through the coke, the conditions would be more favorable for the promotion of combustion than they are if the air is admitted through openings above the fire, and therefore enters the fire-box cold. The two methods may, it is true, be used in combination, but air should not be admitted above the fire without exercising the utmost care that the quantity is not too great. The fact that the admission of any given quantity of air above the fire prevents or diminishes the quantity of smoke is not conclusive evidence of its economy.

The advantage of burning coke alone on the grate is that from its nature it admits of a freer passage of air through it than raw coal does, and therefore a smaller grate may be used and a greater intensity of combustion and higher temperatures are attainable if the grate is covered with coke instead of raw coal. The fact, too, that about 70 per cent. of the supply of air is required for the combustion of the coke or solid carbon, and only 30 per cent. for the combustion of the gas expelled from the coal, shows that it is possible to admit enough air through a layer of coke for its own combustion and that of the hydro-carbon gases, if these are expelled by placing the raw coal on dead-plates.

That the advantage to be gained by the use of dead-plates is not alone theoretical, but that they may be realized in practice, is shown by the experiments made by Mr. Martin, a report of which he furnished to the Master Mechanics' Association, and which will be found on another page. From his experiments it will be seen that "dead-plates 6 in. wide were placed in five engines with marked economy," and Mr. Martin expresses the opinion that "a judicious arrangement of grate-bar opening and dead plates will effect a great an economy as any other single improvement in a locomotive." It is to be regretted that his experiments were not reported more fully and carried out more systematically. In all his experiments, apparently, the dump grate was perforated. On some roads in this country the dump grates are made solid, that is, without perforations. In some of Mr. Martin's experiments increasing the size of the openings in the dump grates improved the performance of the engines, and in another it did not. The advantage of the side dead-plates seemed to increase up to 6 in. in width. There is no reason for believing that a still greater width would not be an advantage. By reasoning from the theory which has been advanced, it would seem that if the dump or drop grate was placed at the back end of the fire-box it would make a better arrangement of grate than any of those shown in the engravings. By doing this and making the drop grate solid, that is without perforations, it would act as a dead-plate at the back end of the fire-box. The side dead-plates might also perhaps then be increased in width to advantage. With this arrangement, that is, with the open or "live" grate at the front end of the fire-box, it will be seen that if it was covered with a layer of incandescent coke, the air entering the fire-box through it would pass upward to the brick arch, and then be obliged to take a backward course around the end of the arch and then forward into the tubes. At the same time the current of the gases distilled from the coal on the drop grate at the back end of the fire-box would meet and mingle with that which has passed through the coke as the two pass around the end of the brick arch. When no brick arch is used, and a dead drop grate is placed at the front end, the gases from the coal rise and enter the tubes with little opportunity of mingling with the air from the grate.

The proportion which the size of the dead-plates should bear to the "live" grate is of course a matter of experiment, and presents a very profitable field for investigation to master mechanics. It is, however, obvious that with a wide fire-box more space is available for side dead-plates than can be used if the fire-box is narrow.

Mr. Martin's experiments on blast pipes are also well worth the attention of master mechanics. His use of the adjustable petticoat pipe is the first attempt to shed some clear light on that very obscure subject. It seems very remarkable that those who are interested in locomotive engineering should be obliged to look to a remote country

in South America for experiments to decide questions which every master mechanic should understand in order to fulfill his duty to his employers. The thanks of all of them are at any rate due to Mr. Martin for the elaborate investigations he has made.

REDUCTIONS IN RAILROAD AND OTHER WAGES.

We endeavored to show last week that, however great the reductions in the wages of employes have been, and however unsatisfactory they may now be, these men cannot say that their employers have not suffered with them. The figures then presented for a large number of the most important roads showed that the profits accruing to the owners of railroad stock were on the average not quite half as great in 1876 as in 1873; and though this fact of itself might not make it proper or practicable to reduce the wages of employes, we cited it as a reason impelling the proprietors of railroads to reduce their expenditures in every possible way, and justifying them in endeavoring to ascertain the lowest market rate.

We have heretofore said that, in the long run, the wages of railroad men will approximate those of men of similar skill and ability in other employments. If the railroads pay less than their men could earn in other employments, they will soon be unable to get men; if they pay more, they will be overrun with applications from good men offering to work for less than the wages which the companies actually pay. That does not prevent temporary fluctuations: indeed, it is by these fluctuations that the supply in each occupation is made equal to the demand. But generally in those occupations in which the supply of labor has just about equaled the demand, at least where skilled labor is required, we should expect to see something like parallelism in the course of wages—that is, if carpenters' wages rise 20 per cent. in a given time we will not expect to see shoemakers' and blacksmiths' wages remain stationary or fall. And when, as during the past four years, there has been a great fall in the prices of nearly all kinds of wages and materials, we would not expect the wages in one occupation to fall 50 per cent. while another fell 10 per cent., without some special reason therefor—some reason which makes exceptional the position of the occupation in which the change in wages has been exceptional.

If the wages of railroad men have been reduced in about the same proportion as the wages of other workmen since the flush times, then, evidently, railroad men have no just cause of complaint against their employers—at least no grievance greater or other than that of all other men who work for wages. If, on the other hand, the reductions in their wages have been exceptionally great, then it is probable that the railroad companies have gone too far, and will be compelled, before long, to increase wages whether they are raised in other departments of labor or not.

What then are the facts? Have railroad wages suffered more than other wages since the flush times of 1873? It seems to be assumed by the community, as reflected by the press, that they have been. Although nearly every newspaper in the country was emphatic in condemning the insurrection with which the strikes were accompanied, a large number of the most respectable of them declared that the reductions in wages made by the companies were oppressive, and that the men had good reason to complain of their treatment. This assumption was perhaps natural, in view of the action of some of the railroad men. They appeared to be exasperated; they resisted the last reduction, in some cases by force. Virtually they made war on account of their grievance, and it was natural to suppose that it must be greater than the grievance of other workmen who submitted quietly. Whether this assumption was correct or not we will now try to ascertain, so far as the material at hand will suffice.

Not a great many facts are needed to settle this question, but unfortunately they are facts not easy to ascertain. There are price currents of almost everything else that enters into the cost of production, but there are no price currents of labor, the most important of all. It is not so difficult to get the wages paid to railroad men, for a railroad company's records are usually kept; but in many occupations it is not easy to find what wages have been paid for a few years back. We cannot expect to give the figures for all the leading employments, but by giving what we can get, and all we can get, we will probably obtain substantially the true course of wages.

And, it should be borne in mind, it is the course of wages and not their actual amount which concerns us in such an investigation. We do not purpose to compare railroad wages with other wages to see which are highest, but the rates of reduction, in railroad wages with the rates of reductions in other wages, to see which are the greatest.

The first figures we give are for building trades, furnished by a Brooklyn contractor:

	1873.	Daily wages.	1877.	Per cent. of decrease.
Masons.....	\$4 00		\$2 50	37½
Masons' laborers.....	2 50		1 50	40
Plasterers.....	5 00		2 50	50
Carpenters.....	3 50		2 50	28½
Common laborers.....	\$1 75 to 2 00		1 25	28½ to 37½

A very large number of men is engaged in these trades.

*For a low grade only \$2 is paid.

throughout the country. They can move from place to place pretty freely, and the wages in one town are likely to be nearly equivalent to those in another, everything considered. The building trade is in an extremely depressed condition, it is true, but whether more than the average is an open question. Let us compare with these reductions, varying from 28½ to 50 per cent., the reductions made upon seven railroads entering Indianapolis, as reported by Indianapolis papers:

	Percentage of reduction in wages from 1873 to 1877.	Av'ge.
Conductors.....	20 46 18½	22 28 8
Brakemen.....	19 38 23 14½	20 26 24
Firemen.....	9½ 25 12	41 31 9½
Switchmen.....	23 23½ 33½	10 33½ 26 12
Trackmen.....	43 40 33½ 33½	44 30 37

The prices reported on the different Indianapolis railroads vary greatly, but in some cases a day's work on one road means something different from a day's work on another, especially in the case of trainmen; but as we are concerned only with the proportion of reduction, this is unimportant for our purpose, the important thing being that what is given as a day's work or other unit of labor should be the same now as in 1873.

The averages of the percentages of reductions are given in the last column, varying, it will be seen, from 21 per cent. for firemen to 37 per cent. for trackmen, while in the building trades reported above the reductions have been from 28½ to 50 per cent.

For further comparison we take the following figures showing the wages paid by a New York contractor in 1873 and now—wages actually paid, and largely in employments in demand for various purposes and all over the country, so that the employes are by no means bound to this contractor or to a single place, but are able to command the general market rate for the time being for such services as they perform:

	1873.	1877.	Per cent. of decrease.
Stone masons on railroad work.....	\$3 00 to \$3 50	\$1 50 to \$2 00	50 and 43
Stonemasons.....	4 50 " 5 00	2 50 44 " 50	
Carpenters on railroad work.....	2 50 " 3 00	1 25 50 " 59	
Blacksmith (exceptionally skillful).....	4 50	2 50	44
Blacksmiths, ordinary.....	3 00	1 50	50
Blacksmiths' helpers.....	2 00	1 00	50
Tracklayers.....	2 00	1 12 to 1 25	44 and 37½
Engineer steam shovel (per month).....	\$118 and \$125	60 00 48 " 52	
Firemen steam shovel (per day).....	\$2 50	1 50	40

Here there is hardly an occupation in which the reduction in wages has not been greater than in any class of labor on any of the seven Indianapolis railroads reported above, and nearly twice as great as the average railroad reductions.

In the case of sailors, the reductions since 1873 appear to have been comparatively small. The figures given at the office of the United States Shipping Commissioner in New York are, per month:

	1873.	1877.	P. c. of decrease.
Able seamen—			
To West Indies.....	\$25	\$20	20
To South America and Mediterranean.....	20	18	10
For long voyages.....	20	\$16 to \$18	10 to 20

Seamen thus appear to have suffered less than railroad men.

In the oil yards and refineries about New York, where a great many men of different trades are employed, including coopers, ship carpenters, house carpenters and machinists, the reductions of wages since 1873 have been, we are informed, just about 25 per cent.

In their shops for construction and repairs the railroad companies come directly into competition with other manufacturers for the great number of machinists, blacksmiths, carpenters, upholsterers, cabinetmakers, painters, etc., there employed, and so are not able of themselves to fix, even temporarily, the rate of wages paid. We have at present no definite information as to the wages paid and the proportion of the reduction, but understand it to have been at least as great as in the case of the train men, while in many shops the men have not had full time, and so have suffered actually a greater reduction in income than the proportion of reduction in daily wages. What is remarkable is that these men, who are qualified to enter the service of individuals and firms, and whose wages are chiefly fixed by the rates paid by individuals and firms, show the least disposition to strike. They find that they are doing at least as well on the railroads as men of the same trades are doing elsewhere, and they cling to their situations, poor as the pay is.

On the whole, so far as this information goes, it appears that railroad employes have not suffered greater reductions in wages than other employes, and that therefore they have no greater cause of complaint than other men who live on wages, and less than many. The action of the railroad companies has been similar to, but later than, that of other employers; they have not been exceptionally oppressive; and they are not, apparently, paying less than the general market rate of wages.

Brooklyn Excursion Railroads.

Assimilated in character to the city street railroad, but worked by steam, is what we may call the "excursion railroad," which is in many respects a species by itself, little talked of and hardly recognized, yet sometimes one of the heaviest carriers of

passengers in the country. The species is sometimes very distinct and peculiar, but it shades off on one side into the suburban railroad, and on the other into the recognized railroad of considerable length. The suburban railroad serves chiefly for the carriage of passengers (or perhaps passengers and freight) between the city at one terminus and the suburbs at the other and on the line. If there is a grove, a lake, a sea-beach, or other popular resort on its line, it usually becomes an excursion as well as a suburban road, carrying several times its ordinary daily traffic on occasions, such as Sundays and holidays. It is when the excursion business forms its chief traffic that we would call it an "excursion" railroad, examples of which are the railroad from New Orleans to Lake Pontchartrain, that from Savannah to Skidaway and the beach, the Boston, Revere Beach & Lynn, and, especially, the roads on Long Island briefly described below. Two of the last named and probably the three first named, are also suburban railroads, having a certain amount of traffic from residents of the country along the line; but in the case of the Long Island roads, at least, this suburban traffic is but a drop in the bucket, and by far the largest part of their traffic consists in carrying city people out to the sea and back again the same day. A longer specimen of a railroad chiefly supported by excursion traffic, though it has a considerable local traffic, is the Camden & Atlantic, from Philadelphia to Atlantic City, and its new narrow-gauge rival between the same points will depend upon excursion traffic for its support.

The first and the last of the railroads described below serve to carry passengers to Coney Island, one of the most frequented surf-bathing resorts in the world. This island is at the entrance to the lower bay of New York, and is accessible by steamer from New York as well as by railroad through Brooklyn, and besides the two roads described below, a third is completed and was opened two weeks ago, and a fourth is also nearly or quite completed, though there are some obstacles to its immediate opening. Four or five steamers run daily to the island from New York, but the Brooklyn railroads also take some of the New York visitors to the island as well as nearly all the Brooklyn visitors.

BROOKLYN, BATH & CONEY ISLAND RAILROAD.

This road extends from the west side of Greenwood Cemetery, Brooklyn, at Fifth avenue and (about) Twenty-eighth street, in a general southeasterly direction to Coney Island, through a thickly peopled farming country, and has two or three small villages on its line, though they are not properly suburban villages, as very few city people live in them. It is the oldest of the three standard-gauge excursion railroads on Long Island, and also, although it is operated exclusively by steam, it deviates the farthest from the ordinary standard for steam railroads. The line is a little over seven miles long, and for the greater part of that distance occupies the streets and highways, turning several right-angles therein with radii of from 75 to 125 feet, and in no case even crossing the road for the purpose of increasing the radius. The grades also are heavy, though none of them are very long, the heaviest being about 2 per cent. (105 feet per mile) in two sections, aggregating about ¼ mile, with the heaviest curve on the line, 75 feet radius and about 80° long, included between them. No more costly grading has been done for the line than for any good horse railroad, except on the comparatively short distances where the line leaves the highway, and on these the earthwork is of the lightest character. The road has been in operation about 11 years, and the reported cost of the road-bed and superstructure, including iron, is, \$74,436, or about \$10,600 per mile. This amount, however, is nearly double what would be the proper cost of the road at the present day.

No ballasting has been done on the line, the nature of the surface (a porous, sandy soil) rendering this less essential than usual. The weight of rail most in use is 45 lbs. per yard, but this is being replaced as fast as worn out by a 56 lb. rail to correspond with the demands of the heavier rolling-stock recently introduced. Much of the 45 lb. rail has been in use 9 or 10 years and sustained an average traffic of about 10 round trips (of dummy engines) the year round. This, however, is by no means a heavy duty, as the entire average weight of engine and load during this period has not exceeded from 10 to 15 tons. The ties are chestnut and oak of the usual size and number per mile. Fish-plates are only partly in use, but are being introduced as fast as rails are renewed. From 35 to 40 men are employed on maintenance of way during the season (extending for about 100 days from June 15 to the end of September), and 6 or 7 men during the winter.

The motive power in daily use consists of four engines, weighing 17 tons in all (about 14 tons on the drivers) including 500 gallons of water carried in a saddle tank and from 500 to 600 lbs. of coal, the latter being sufficient for from two to four round trips, according to the load. A fireman is carried, but his duties are of the lightest, mainly consisting in ringing the bell. The engines have 4 drivers, 42 inches in diameter and 7 feet apart, with a "pony" truck in front having 24 inch wheels. The total wheel base is 14 feet and is connected by equalizing levers throughout, with a cross-equalizer between the forward drivers. The cylinders are 11x16, the fire-box about 4 ft. 6 in. by 2 ft. 10 in., and the tubes are 120 in number, 1½ in. in diameter and 6 feet in length.

The engines were designed and built by the Baldwin Locomotive Works and the cost of the last purchased was \$6,000. The oldest in use (about four or five years old) cost \$8,000. Their average duty is from 7 to 8 round trips daily, or a little over 100 miles per day. Ten and eleven trips, however, are frequently made. Their habitual load on Sundays—the busiest day on these railroads—is six fully loaded cars, weighing about 66 tons in all (42 tons of cars and 24 tons of passengers); and assuming the total resistance on the maximum grade to be 40 lbs. per ton for the grade or the curve and 10 lbs. per ton for rolling friction, this would require a total adhesion of about 4,150 lbs., or about one-seventh of the weight on drivers. The

resistance of the curve, however, must greatly exceed this. Not infrequently seven cars are taken up the same grade and curve, but the engines are somewhat assisted by a previous down grade.

In addition to the four engines above described two lighter engines, of the same general design and by the same builders, are employed in winter and auxiliary service.

The cars are all of the open "excursion" type (with the exception of three small closed cars used in winter) and are closed up in case of storm with canvas side-curtains. The body is 36 feet long by 7 ft. 2 in. wide with six sills; the two outside sills 4 x 9 inches and the rest 2½ x 9. The seats are 14 in number, 7 ft. 1 in. long in the clear (7 ft. 8 in. from out to out) and seat comfortably five persons and frequently six. The weight of the cars empty is about seven tons. Allowing five persons per seat gives 70 passengers, or about four tons, making the ratio of live to dead load 1 to 1.75, and this ratio is habitually realized in the busiest part of the day. The seats are of open slats, 12 inches wide and 28 inches apart, leaving 16 inches in the clear between them. The backs are simply a rounded strip 6 in. wide, and are reversible, making a tolerable seat for a short trip. A large part of the above economy in dead weight is doubtless incidental to the excursion type and to the comparatively narrow and crowded seats, but this is by no means wholly so. By cutting an aisle down the centre and placing the seats 3 ft. apart longitudinally (about the same as in ordinary passenger cars) these cars would still seat 48 passengers, and these changes and light boarding and alighting on the sides need not add over half a ton to the weight of the cars, making the dead weight 15,000 lbs., or about 312 lbs. per passenger, as against 650 lbs. or more per passenger in the ordinary type of passenger car, and the latter would then afford no greater comfort or roominess nor have much, if any, advantage in respect to safety or durability. All the cars on this railroad (and the others described below) are only 3 ft. 6 in. from rail to floor—an especially commendable feature. The trucks have a 4 ft. wheel-base and are all of excellent design, strong and durable, but light and cheap. Twenty-four-inch wheels are used, and so heavy is the duty upon them on account of the sharp curves and imperfect surfacing that about one-third of them are renewed yearly. As the average mileage per car cannot possibly exceed 25 miles per day, or about 9,000 miles yearly, this is equivalent to an average duty of no more than 27,000 miles. Great precautions are evidently taken to maintain the running gear in perfect condition. Derailments are almost unknown. But one wheel or axle has been broken while in service in seven years. The draw-head attachments on these cars (and those of the other railroads below described) are especially light, strong and serviceable.

The passenger equipment consists of four cars of the type above described and 22 cars of somewhat smaller dimensions, having 13 seats instead of 14, and weighing only five tons. As fast as these wear out, however, the heavier type is substituted.

The regular running time over this line is 37 minutes, making seven stops, or at an average rate of somewhat over 11 miles per hour. A low rate of speed is essential on the greater portion of the line or the time might easily be cut down 10 or 15 minutes and doubtless would be. A majority of the trains on week days consist of but one car. One conductor and one brakeman are always carried, with an additional brakeman for trains of over two or three cars. Thirty trains daily are run during the season, and as high as 2,700 passengers have been carried down and back on pleasant Sundays and holidays. For nearly nine months in the year but one train is run, making seven trips daily and stopping for passengers as a horse car.

The shop facilities are but limited, the stock being sent away during the winter for any needed repairs of importance. A mechanic and helper are kept employed, however, and a blacksmith for six months in the year. The freight business is extremely trifling, but three flat cars are kept moderately well employed at \$5 per car to any point on the line.

The receipts of the road in 1874 were:

From passengers.....	\$45,309
" freight and miscellaneous.....	1,742
Total receipts.....	\$47,051
The expenses were:	
For maintenance of way.....	\$35,026
" movement expenses.....	18,748
" station, general.....	6,936
Total expenses.....	\$50,710

Showing for that year a deficit of \$3,659; but this was doubtless largely caused by extensive improvements, as is indicated by the fact that the previous year, when one-sixth more passengers were carried (425,239), the expenses

Gross Earnings, Expenses and Net Earnings of the Brooklyn, Bath & Coney Island Railroad for Eight Years.

	Gross earnings.	Expenses.	Net earnings.
1869-69.....	\$30,133	\$37,973	\$7,820
1870-70.....	35,842	27,323	8,514
1871-71.....	41,716	33,216	8,500
1872-72.....	51,901	35,340	16,561
1873-73.....	47,591	29,351	18,240
1874-74.....	56,958	32,341	24,617
1875-75.....	47,051	50,710	\$3,659
1876-76.....	46,172	43,120	3,052
Total.....	\$357,384	\$289,379	\$68,105
Average.....	\$44,673	\$36,172	\$8,513

* Deficit.

The reported cost of the property at the close of the last year was:

Road.....	\$81,234
Land, buildings, etc.....	80,475
Equipment.....	158,632
Total (\$320,341 per mile).....	\$220,341

were but \$32,341. The number of passengers moved in 1874-75 (the last reported) was 360,463, or about 15,000 per car. The fare through is 20 cents.

The business of this road has been largely affected recently by the completion of the new Prospect Park & Coney Island

Railroad, which likewise has its termini in Brooklyn and Coney Island, and is supported almost exclusively by the excursion traffic to Coney Island Beach. A better idea of the average result of the working of the Brooklyn, Bath & Coney Island road will be had by examining the statements of gross earnings, working expenses and net earnings for each year since 1869, the figures being those reported to the State Engineer and Surveyor by C. Godfrey Gunther, the proprietor, who bought the road at foreclosure sale in 1868 and has worked it since, the road being owned by an individual and not by a corporation.

The average net earnings reported have been equivalent to 3 per cent. on this amount; but the equipment and consequent cost of the property has considerably increased of late, and the income on the cost in 1873-74, before the opening of a competing road, was 9½ per cent. All this is on the assumption that the expenses reported were all strictly for maintenance and working, and not at all for adding to or improving the property.

CANARSIE & ROCKAWAY BEACH RAILROAD.

This road runs from East New York, just east of Brooklyn, to Canarsie, on Jamaica Bay, and is the shortest of the three lines under consideration, being only four miles in length. The grades are moderately heavy, from 80 to 100 feet per mile at points, but none of these grades are very long, and there are but four curves on the line, all of easy radii, with the exception of one near the East New York terminus, of about 175 feet radius and 80° in length. The engines employed take their maximum trains around this curve without difficulty, but at moderate speed. The coarse, sandy soil on the line furnishes a natural ballast, and the road-bed is kept in fair condition. The rails weigh 45 lbs. per yard, with a very miscellaneous assortment of joints for so short a line, but fish plates are used on all new rails. The ties are of chestnut, 7 feet in length, and rather light in section, and cost about 60 cents each. The grading done in construction is almost nominal, though more extensive than on either of the other roads described. There is one cut (and corresponding fill) on the line, about three feet deep and 800 or 900 feet long, but in general the line follows the surface closely, giving a very undulating profile for this region of Long Island.

The motive power consists of two engines weighing 16 tons each and one engine weighing about 12 tons, all built by the Grant Locomotive Works of Paterson, N. J., and all of the same general design, viz.: four drivers with "pony" Bissell trucks in front and rear, so that this line, unlike the other two described, has no turn-table nor use for one. The larger engines are 21 feet long in all, with 10x16 cylinders, 48 in. drivers 6 ft. 6 in. apart, and 24 in. truck-wheels. The side tanks carry 500 gallons, sufficient for five round trips or about 40 miles, and about 300 lbs. of coal are carried loose on the floor of the cab, the latter being made quite large for the purpose. This is doubtless for the convenience of the engine-runner, as no fireman is carried. The boiler is 39 in. in diameter with 54 2 in. tubes, 10 ft. 6 in. long. The fire-box is 3 ft. 3 in. by 2 ft. 6 in. The cost of the last engine purchased was \$5,500, this being a duplicate of one purchased a few years before for \$6,500.

The average duty of these engines is 14 round trips daily, or 112 miles. The duration of the busy season being about 100 days only, little or no trouble is experienced from engines breaking down or needing repairs, all repairs of any importance being made during the winter. One man, however, is kept constantly employed on small repairs. Heavy loads are hauled on occasion, every pleasant Sunday or holiday requiring trains of seven cars, with about 800 passengers and weighing in all about 100 tons exclusive of engine. The weight on the drivers being but little over 10 tons, this would require an adhesion of nearly one-fourth on the maximum grades if they were of any length. The running time is 15 minutes per trip, or 16 miles per hour, including one regular stopping place and three flag stations. Sand is very rarely used except late in the season, when the grass often overlays the track, showing that the force of from two to twelve trackmen which is employed on the line is by no means excessive.

The cars are eight in number and all "open excursion," very similar in design and appearance to those already described, except that the seats are back to back and non-reversible. They seat 90 persons comfortably and more on occasion. They are 39 ft. 4 in. long by 7 ft. 2 in. wide and weigh only 6 tons. They are, however, strong and durable, the details of construction being excellent throughout. The seats are 18 in number, 7 ft. 5 in. long in the clear, and 14 inches wide, with 22 inches of space between them for the knees of two passengers. The backs are 20 in. high. Thirty-inch wheels are used with a 4 ft. 6 in. wheel-base. The cars were built some two years since by J. G. Brill & Co., of Philadelphia, and cost \$1,650 each.

In addition to the passenger business, a trivial amount of freight business is done with four four-wheel flat cars.

The rate of fare is 25 cents per round trip. We are unable to give any statistics of expenses and receipts, as the line (singularly enough) appears to be wholly omitted from the reports of the State Engineer and Surveyor. About 1,000 passengers per week day is the average of the season, with 3,000 or over on pleasant Sundays and holidays. A peculiar disadvantage under which all these lines labor is that, as a rule, two round trips must be run for every train-load of passengers. The traffic is all down in the morning and back in the evening, with an approximate equality for a short time only in the middle of the day. This increases the cost per passenger moved at least 30 or 40 per cent.

PROSPECT PARK & CONEY ISLAND.

This railroad, the last built of any of the standard-gauge lines now in operation to the sea shore, is or has been in advance of them all in very many respects. The alignment is far more favorable than that of the Brooklyn, Bath & Coney Island Railroad, being practically one long tangent except for one or

two slight swerves in the line. A very disadvantageous feature, however, is a long and heavy grade immediately adjacent to the Brooklyn terminus consisting of ¼ mile of 4 per cent. grade and ¼ mile of 2½ per cent. with a 14° curve (410 feet radius) at the top of the grade and immediately adjacent to the station. Except at this point the grades are very light and the earthwork merely nominal. The line is 5½ miles in length, with rails of 45 to 56 lbs. per yard, but mostly 45 lbs. per yard. The ties are of the ordinary size and frequency. Considerable ballasting has been done on the line and more is proposed.

The motive power consists of three engines of 20 tons weight, 11x16 cylinders, one engine of 25 tons weight, 12x18 cylinders and one engine of 28 tons, 13x20 cylinders, the drivers in each case being (we believe) 42 inches in diameter. The engines were built by the Baldwin Locomotive Works, and are all of the same design, four drivers and pony truck in front. These engines and those on the Brooklyn, Bath & Coney Island Railroad, above described, are almost precisely similar in detailed design, except in respect to size and weight. This difference in weight is necessitated solely by the heavy grade at the Brooklyn terminus of the Prospect Park & Coney Island Railroad, and is a constant source of disadvantage under which it must always labor.

The cars are open excursion, 45 feet long in the clear, with 16 reversible seats holding five each comfortably, or 80 passengers in all, and weighing empty 7 tons. The 11x16 engines haul in daily service five of these cars loaded up the 211 and 176 feet grade and around the 14° curve, being assisted by the impetus gained on a previous descending grade at high speed. Allowing the total weight of train to be 80 tons, this requires a tractive force of about 6,400 lbs. on the 176 feet grade, equal to an adhesion of about one-fifth the weight on drivers—a somewhat heavy ratio for passenger trains. As the trains strike the grade, however, at a velocity of about 30 miles per hour or 44 feet per second, and come to a state of rest at the top of the grade, the accumulated momentum alone is adequate to lift the train 30 feet vertically out of the total of about 100 feet.

This line does by far the heaviest business of any of the excursion roads. Seventy trains per day (35 round trips) are made over the line, using but one siding. The running time is 15 minutes for express trains (which constitute about three-fifths of the whole) and 20 minutes for way trains, or at the rate of 23 and 17 miles per hour, respectively.

This road was built originally by the "Greenwood & Coney Island Railroad Company," but before it was opened it was consolidated with the Park Avenue (street railroad) Company, which owned 4.7 miles of street railroad, extending from Fulton Ferry, in Brooklyn, to the Greenwood terminus of the steam road. The operations of the two roads are reported together in the State report, so that it is not possible to obtain an accurate account of those of the steam road separately. By comparing the report of the consolidated company for 1874-75, however, with that of the street railroad for 1873-74, it appears that the number of passengers carried by the latter (given separately) increased from 1,592,076 to 1,939,358, or 21½ per cent.; and while the expenses of the street railroad exceeded its earnings by \$4,215 in 1873-74, the consolidated company had \$43,338 of net earnings the following year. The number of passengers carried on the steam road that year was 297,242; but that was the first year of its operation, and it was open but part of the season, we believe.

In 1875-76 the number of passengers carried by both steam and horse railroads was 2,656,790, or nearly one-third more than for the previous year, but the passengers by the steam road are not reported separately. The receipts that year were \$238,658, and the expenses \$165,502, leaving as net profits \$68,156, which is nearly 60 per cent. more than the previous year.

The number of miles run by trains in 1874-75 was 23,377, and the number of passenger miles of the steam railroad was 1,486,210, giving an average of 64 passengers per train. The fare over the entire length of the line is 25 cents, or four cents per mile.

The Late William B. Ogden.

The daily press has left little to be said regarding the character and public services of Mr. Ogden, and we design now only to make brief reference to his relations to those whom he employed. Mr. Ogden was for many years a very large employer of the labor of others, and we suppose no man was ever more successful in securing the confidence, hearty service and affection of those under him. His great executive ability is well known; but there were other and perhaps as important elements in this success. He possessed a very extensive practical knowledge of mechanical and industrial methods and appliances, with a quick observation, retentive memory and ready ingenuity, and made himself as truly master of his work as of his workmen. Always ready to put his hand to the work, he was more apt to show than to tell how it should be done, and while his ingenious expedients were often worth a hundred hands, his patience, cheerfulness and courage were sometimes worth a thousand. His fine courtesy, his hearty good will and kindness of manner were never laid aside, nor ever more marked than in his intercourse with his workmen. It is much to be desired that the many who will emulate his character for energy, foresight and skill will also emulate this rarer quality and habit.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Rochester & State Line.—Extended 6 miles, to a point 47 miles from Rochester, N. Y. On the south end track laid from Machias, N. Y., southwest to Ellicottville, 14 miles, making 20 miles extension.

Cincinnati & Eastern.—Extended from Sardinia, O., east to Winchester, 10 miles. It is of 3 ft. gauge.

Fond du Lac, Amboy & Peoria.—The first track is laid from Fond du Lac, Wis., south to Mayville, 20 miles. It is of 3 ft. gauge.

Florence, Eldorado & Walnut Valley.—Track laid from Florence, Kan., to Eldorado, 29½ miles.

This is a total of 79½ miles of new railroad, making 830 miles completed in the United States in 1877, against 1,046 miles reported for the corresponding period in 1876, 594 in 1875, 913 in 1874, 1,966 in 1873 and 3,372 in 1872.

THE GRAIN TRAFFIC FROM THE CROP OF 1876 has not after all been as bad as is sometimes made to appear. Especially discouraging have been the reports for this calendar year—for the period since December. If we take the crop year, the appearance is not so unfavorable. Reports of the New York Produce Exchange make the crop year begin Aug. 1 for the receipts at the Northwestern markets, which is probably the best date for small grains. Now the returns are complete for this year, lacking three days, and the figures are, for four years:

	1877.	1876.	1875.	1874.
Flour, bbls.....	4,892,534	5,343,659	5,327,843	6,309,895
Grain, bush.....	154,412,580	157,563,765	143,078,219	180,370,466

Total, bush.....178,875,250 194,292,110 169,717,434 211,819,941

Taking the totals of flour and grain, the receipts of the last crop year are but 8 per cent. less than those of 1875-76, are 5½ per cent. more than the receipts of 1874-75, and are 15½ per cent. less than those of 1873-74—which were the largest on record. If we compare the receipts at the same markets for the first seven months of the calendar year, we will find them to be:

	1877.	1876.	1875.	1874.
Flour, bbls.....	2,233,842	2,935,768	2,658,885	3,539,831
Grain, bush.....	67,273,596	68,653,307	71,835,451	98,907,361

Total, bush.....75,442,806 101,392,147 85,129,876 116,606,516

Here the receipts of this year are 22½ per cent. less than those last year, 8 per cent. less than those of 1875, and 34 per cent. less than in 1874. Evidently an unusual proportion of last year's crop was marketed before the New Year, and one of the reasons for this doubtless was the extraordinarily low rates maintained by the railroads long after the close of navigation, which caused grain to be sent forward which otherwise would have been held until later. Certainly there has been a greater inducement to producers to market their grain during the latter part of the crop year, for the prices have been much higher. They have sent less than usual of late months, because they had less to send, and one reason why they had less to send is because they took advantage of the low rail rates last fall and in the early winter, and reduced their stocks below their usual level. The last week, however, shows a turn in the tide, receipts and shipments showing an increase over 1876.

THE PENNSYLVANIA RAILROAD COMPANY, which for several years and until a few years ago paid 10 per cent. dividends annually so regularly that many came to look upon its stock as one of the safest investments for income, has passed the quarterly dividend which ordinarily would have been declared on the first of August, the reason assigned by the directors not being want of funds, however, but the necessity of making large extraordinary expenditures to replace the most indispensable parts of the property destroyed in the Pittsburgh riots. The strikers, therefore, may have the satisfaction, if it is one, of having made every proprietor of the railroad feel personally their wrath and suffer from it. They may also make the public reflect that the railroad employees were not alone sufferers, but that the proprietors had also losses to complain of. Shortly after the panic of 1873 the Pennsylvania dividend was reduced from 10 to 8 per cent.; last winter there was a further reduction to 6 per cent.; so that before the recent reduction of wages was made, the owners of this railroad had suffered a reduction of 40 per cent. in their income from it. Now that income disappears entirely—temporarily, it is hoped and expected—but still for the present it is annihilated, and while the employee is complaining of reduced income, the employer goes without any.

NEW PUBLICATIONS.

A General Classification of Railway Rights, Realities and Personalities; designed to facilitate the work of taking an accurate inventory of such property: by Geo. T. Balch, C.E., late Brevet Lieut.-Col. Ordnance Department, U. S. A.

This is a modification of the publication entitled "A General Classification of Railway Realities, Rights and Plant," prepared by Colonel Balch as the first step in taking the inventory of the property of the Erie Railway Company, and noticed by us Sept. 11, 1875 (page 378); the new classification is made after the work of taking the inventory had been completed, and therefore after experience had been had in the practical difficulties of such a work. Certainly the importance—the indispensability—of a systematic classification was pretty well shown by the results of the first efforts to take an inventory, when, as Colonel Balch says in his preface to the work now under consideration, "the value of those portions of the estate which had escaped enumeration largely exceeded that of the portion which had been inventoried, and, in short, four-fifths of the work ordered by the Court remained to be executed."

There could hardly exist a better opportunity for developing a system of classification than this which Colonel Balch had in charge of the inventory of this most complex property. The publication of two years ago showed the plan conceived by an officer experienced and expert in organization and administration; this one has the modifications suggested by practical experience in the work. The chief part of the work consists of the indices to franchises, real estate and personal property used in compiling the Erie inventory (noticed by us April 6, 1877), so that the work affords not only a classification of property, but also a model of the presentation of it. As to the availability of such work for general application, we had something to say two years ago; now we content ourselves with quoting the closing paragraph of Colonel Balch's preface on the same subject:

"The intimate relation existing between the organization of a railway and a correct classification of its property is such that we may safely assume the latter to be a function of the former; but as the general principles governing the administration of all large railway corporations are identical in spirit if not in application, any scheme of classification of such property which can be successfully applied to the estate of one will be equally applicable to the estates of others. Hence the value of the technical work which is crystallized in these indices, comprehending as they do the franchises and property of twenty-four separate railroad companies, representing a present worth of nearly ninety millions of dollars, is not limited to the field in which that labor has been successfully performed, but has a far wider application and a broader professional significance. In this spirit these results are submitted to those persons interested in the management of this class of works, not as a completed study, but rather as a suggestive step in the direction of a more perfect knowledge of the relation subsisting between railway property and railway organization, without which knowledge the most economic, efficient and pecuniarily successful administration of railway business is absolutely unattainable."

Contributions.

Replacing Property Destroyed by Rioters

TO THE EDITOR OF THE RAILROAD GAZETTE:

I believe there is little difference of opinion in regard to the responsibility of cities where property has been destroyed during riots, but I see it stated in several papers that "it is the intention of the Pennsylvania Railroad to punish the city of Pittsburgh by removing their shops from there." If the citizens allow this without protest, being still held responsible for the loss, they will neglect an undoubted right, for they have the same right to replace the property destroyed that insurance companies have.

WYANDOTTE, KAN., Aug. 3, 1877.

[It is not probable that the Pennsylvania Railroad Company will do anything for the purpose of punishing the city of Pittsburgh. Should it avoid as far as possible the placing of shops and the concentration of rolling stock there, it will doubtless be because it believes such property to be safer somewhere else. Neither rewards nor punishments play much of a part in the motives which govern a great corporation. But whatever may be the rights of Pittsburgh as to restoring or paying for the property destroyed by its failure to keep the peace, they will hardly be likely to affect the location of the railroad shops. Aside from the depots, which the railroad must have in Pittsburgh, probably more than nine-tenths of the property destroyed consisted of locomotives, cars, machinery and tools in the shops, and freight in transit. The shop buildings were worth little in comparison. Thus what Pittsburgh has to pay for is chiefly movable property. The liability of disorder in a place is properly to be taken into account in establishing a great manufactory where many men are employed, and the failure of a community to preserve order will inevitably tend to make capitalists avoid it, and a manifestation of this fact will probably have a good effect. Owners of city property are apt to be only passive opponents of disorder: when they find that a riot unchecked for some days brings down the value of their property, they may take as much trouble to suppress a riot as the rioters do to make it. — EDITOR RAILROAD GAZETTE.]

Experiments with Car Brakes.

CLEVELAND, Ohio, July 23, 1877.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you give space in your valuable journal for a brief account of experiments with car brakes, made on the 18th inst., at Collinwood, on the Lake Shore & Michigan Southern Railway? The object of these experiments was to determine what effect, if any, the different methods of hanging or attaching the brakes has upon the tilting of the trucks, which in some instances has been observed to occur when the brakes are strongly applied to a moving car; and which, by decreasing the weight upon the rear pair of wheels in each truck, renders them more liable to slide upon the rail, and thus decreases the effectiveness of the brakes. (By referring to the appended table it will be noted that in the pushing of the Empire car, the transfer of weight from one pair of wheels amounted to as much as 25 per cent. of the weight which that pair of wheels supported when at rest.) Four cars, each equipped with a different style of brake, were used in the trials, which were conducted in the following manner: The car was first placed upon the scales, and the total weight taken. The locomotive was then attached, and the car moved forward until the front pair of wheels were brought just off the scales, and the weight of the three pairs of wheels still remaining on the scales was taken. The brakeman was then directed to set the brakes as hard as he could, and (the weighmaster being in readiness) the engineer was signaled to operate the engine so as to bring a gradually increasing pull upon the car, and the weight indicated just before starting it taken. The engine was then reversed, and the weight taken while a push was being exerted upon the car. In no case were the brakes set so hard as to cause sliding of the wheels. In order to ascertain if the pulling or pushing upon the car disarranged the scales in any way, a car was placed with one truck upon them, and weighed when at rest. The brakes were then set, and first a pulling and then a pushing force exerted upon the car by the engine, and the effect upon the scales observed in each instance. The results indicated that no material disarrangement took place to affect the accuracy of the weighing. It was, however, found difficult to operate the engine with sufficient steadiness, while pulling or pushing upon the car, to allow the weighing to be done with any nice degree of precision; hence in most in-

stances the weighings were several times repeated. Although we employed no means of accurately determining the amount of force exerted in pulling or pushing the car, it was evident, in some of the trials, that, owing to some peculiarity in the condition or adjustment of the brakes, much less force was required to move the car in one direction than in the other, although the brake-wheel remained in the same position. In the trial with car No. 5378, which had brakes on both trucks, suspended from floor of car and on outside of wheels, it was observed that the brakes held well; while the tilt of the trucks (as shown by the scales) was very slight. From the results obtained I am satisfied that the tilting of the trucks may be almost entirely overcome by this method of hanging the brakes, although there is a slight transfer of weight from the rear to the front truck. It is not deemed necessary at this time to enter into any discussion concerning the manner in which the forces act to produce the tilting of the trucks. Below is a statement giving a description of those peculiarities in the construction of the several cars, trucks and brakes, which are likely to have any important bearing on the questions under consideration; also the weights obtained under the different conditions.

EDWIN SQUIRE.

EXPERIMENTS WITH CAR BRAKES.

Name of car.....	N.Y.C. & H.R.R. car.	L.S.&M.S. stock car.	Empire car.	L.S.&M.S. caboose.
No. of car.....	8,734	5,378	7,095	162
Length of car.....	29 ft.	30½ ft.	36 ft.	33 ft.
Distance between trucks from centre to centre.....	19½ ft.	21 ft.	26½ ft.	22 ft.
Wheel base of truck.....	4 ft. 11 in.	4 ft. 11 in.	5 ft. 1 in.	6 ft.
Height of truck.....	3 ft.	2 ft. 7 in.	2 ft. 8 in.	3 ft. 3 in.
Diameter of wheels.....	33 in.	32 in.	33 in.	32 in.
Vertical distance of brake-bar below centre of wheel.....	1 in.	4 in.	4 in.	4 in.
Length of brake-shoe.....	12 in.	15 in.	14 in.	15 in.
Distance from upper end of hanger to centre of brake-shoe.....	22½ in.	12 in.	12 in.	11 in.
Inclination of hanger.....	1½ in. in 16 in.	5 in. in 16 in.	7 in. in 16 in.	11 in. in 16 in.
Brakes, on how many trucks.....	One (front).	Both.	One (front).	Both.
Brakes, how supported.....	Slide on horizontal floor of car.	Hung to bolster.	Hung to frame of truck.	Hung to frame of truck.
Brakes, where acting.....	Between wheels.	Outside of wheels.	Between wheels.	Outside of wheels.
Brakes, in what condition.....	Good.	Good.	Bad.	Good.
Weight of car.....	22,050 lbs.	20,370 lbs.	17,780 lbs.	30,000 lbs.
Weight of car at rest.....	16,340 "	15,180 "	13,370 "	22,900 "
Weight of three pairs of wheels being pulled.....	15,800 "	15,130 "	12,630 "	21,410 "
Weight of three pairs of wheels when being pushed.....	17,320 "	15,180 "	14,400 "	22,380 "

The Railroad Strikes.

The great strike may now be considered over, and traffic has generally been resumed on the roads affected by it. There is some lingering trouble in the anthracite coal regions in Pennsylvania, but it comes from striking miners and not from railroad men. We give below some notes of the closing phases of the strike on the various roads.

Baltimore & Ohio.—We noted last week the resumption of traffic east of Wheeling and Parkersburg. As expected, the force called out by the Governor of Ohio compelled a break in the blockade at Newark, O., and Columbus, and freight traffic over the whole line was resumed. Many of the strikers came in and resumed work, but a considerable number remained out and have been discharged. At Newark, Columbus and Bellaire several strikers have been arrested and held for trial.

Central of New Jersey.—As noted last week, the strike on the Central Division closed practically July 29. On the Lehigh & Susquehanna Division, however, the railroad men were backed by the coal miners and held out until Aug. 6, when the running of trains was resumed, most of the strikers coming back to work. The upper end of the road is still guarded by a force of militia and Federal troops, as the miners still remain on strike and in a very unsettled condition. One man has been arrested in Phillipsburg and several near Wilkesbarre, and both will be held for trial. There has been some local trouble from a strike of the laborers on the coal docks at Port Johnston.

Chicago, Burlington & Quincy.—The men on this road returned quietly to work and the strike ended almost as quickly and as quietly as it began.

Delaware, Lackawanna & Western.—The only part of this road obstructed during the last week was the Bloomsburg Division, which was held at several points by striking miners, but was finally cleared on Aug. 6 with the assistance of Federal troops. The miners are still out, however, and there was a serious riot in Scranton, Aug. 2, which was put down by superior force.

Indianapolis, Cincinnati & Lafayette.—The rioters at Indianapolis having stopped trains on this road, which is in charge of the United States Circuit Court, a number of them were arrested and taken before that Court, which sentenced them to 90 days' imprisonment for contempt.

Kansas Pacific.—The strike at Kansas City is over and traffic has been resumed without interruption.

Lake Shore & Michigan Southern.—The strikers at Collinwood and Cleveland finally returned to work Aug. 3, very few remaining out. The company on its part agreed that the classification of engineers shall be abolished; men shall be furnished trip passes on application; train men shall be paid overtime for all detentions over two hours at different points; no men shall be discharged for participating in the strike movement. The strike on this road lasted 12 days in all.

Lehigh Valley.—Travel on the lower end of this road was resumed Aug. 2, but trains did not run freely to Wilkesbarre until Aug. 6. Most of the men discharged were re-employed by the company on their offering to resume work. The road is still guarded by troops, chiefly to prevent trouble from the miners.

Missouri, Kansas & Texas.—Traffic has been fully resumed, the compromise noted last week having been accepted. It relates chiefly to the settlement of the back pay.

Ohio & Mississippi.—Traffic is fully resumed, and all trains are running. Some of the Vincennes rioters were arrested and sent to jail for 90 days, for contempt of the court in whose charge the road is.

Pennsylvania.—The strike is now entirely at an end and the company has begun the work of repairing damages. A few arrests of trainmen charged with joining in the riots at Pittsburgh have been made at Altoona and elsewhere.

Philadelphia & Reading.—All trouble on this road seems to be over, even the miners along the line being generally at work. A large number of persons have been arrested for joining in the riots at Reading and have been held for trial.

Pittsburgh, Cincinnati & St. Louis.—The blockade at New-

ark and Columbus was broken Aug. 2, and traffic has been fully resumed. Several strikers who attempted to stop trains were arrested and held for trial.

Pittsburgh, Fort Wayne & Chicago.—The strikers at Fort Wayne returned to work on the evening of Aug. 1, and by the next morning all trains were moving as usual.

St. Louis, Kansas City & Northern.—The trouble at Kansas City is over and trains are running as usual.

St. Louis & Southeastern.—At latest accounts a few of the men had not resumed work, but their places had nearly all been filled and there was no interruption in the movement of trains.

Toledo, Peoria & Warsaw.—A number of the rioters who stopped trains on this road at Peoria were brought before the United States Circuit Court, in whose charge the road is. After trial they were sentenced to pay \$50 fine each, and in addition two of them received four months' and the rest two months' imprisonment.

Hon. Wm. B. Ogden.

Hon. William B. Ogden died last Friday morning at 2:20 o'clock, at his villa, Fordham Heights, N. Y., in the 72d year of his age. His life was one of great public activity, and perhaps no man in the community has done so much as he to build up the great northwestern country. His inclinations never led him to office, and business activity was with him always preferable to political excitement, but he had that pride of citizenship which impelled him to come forward at times of emergency, when the country needed mature judgment and energetic and intelligent action. He had, too, that largeness of soul which kept him serene both in prosperity and adversity.

Mr. Ogden was born in Walton, Delaware Co., New York, in the year 1805. The sudden death of his father while he was yet only 16 years of age called him from the study of law, for which he had been intended, and from that time until his removal to Chicago he was engaged in lumbering and other business in his native country. His duties as a citizen went hand in hand with his business activity, and in their discharge he entered the military service of the State when he was 18 years of age. He subsequently filled, for several years, the position of Brigade Inspector. In 1834 Mr. Ogden was elected to the State Legislature, that the construction of the Erie Railroad, which was then proposed, might have the benefit of his special advocacy. He went to Chicago in 1835 and established a land and trust agency, which is still conducted by members of his family. His business transactions in Chicago were on an immense scale. He was quick to discern the courses of business, and equally prompt to supply the needs of the community. He laid out and constructed at his own cost more than 100 miles of streets, and he was also the first to construct a swing-bridge in Chicago, built after his own design. His transactions in real estate were on an immense scale. He labored energetically to maintain the public faith and credit. During the term of his Mayoralty (he was the first Mayor of Chicago), on one occasion, at a public meeting convened to delay the legal process of creditors, he gave such urgent advice to his fellow-citizens not to tarnish the honor of an infant city that his counsel prevailed. His public spirit was great, and his energy untiring; his activity and zeal were held in check by a well-regulated judgment, and his manners and address were of the captivating order. The largeness of his enterprise and the extent of his influence will be understood from the fact that he was President of the Rush Medical College, President of the Galena & Chicago Western Railroad Company, and President of the Chicago & Northwestern Railroad Company. He was also chosen to preside at the great National Railroad Convention held at Philadelphia in 1850, to take measures for the construction of the Pacific Railroad; was President of the Illinois & Wisconsin Railroad Company; of the Buffalo & Mississippi Railroad Company in Indiana, until merged in the Michigan Central, and of the Board of Sewerage Commissioners of Chicago. He was, besides, President of, and carried out largely from his own means, the construction of the Chicago, St. Paul & Fond-du-Lac Railroad, and took an active part in the directory of the Pittsburgh, Fort Wayne & Chicago Railroad Company, and was afterward Receiver of the same during its reorganization. He was chosen first President of the Northern Pacific Railroad upon its organization under the act of Congress, but the demands of his own vast business concerns compelled him to retire from the position. Among other interests requiring his attention was his great lumbering establishment, the factories of which were situated at Peshtigo, in Wisconsin.

Mr. Ogden was politically classed as a Democrat of the Madison school. He had never any hesitation about opposing the nominations of his own party when they seemed to him unfit or improper, and was himself no office-seeker. Office had no charm for him, except when duty dictated to him that in office he would best serve the interests of his country. That he was ready to merge his own dislike to office and to political life when the occasion called for such self-denial was shown in 1860, when, in an important emergency, he consented to accept a seat in the Illinois Senate. In the same year the expediency and propriety of nominating him for President was strongly urged, the advocates of such a course relying on the strong ground that he had been for most and immeasurably ahead of all other men in maintaining the public credit and advancing public improvements. Indeed, the value of his labors is made manifest by the public works all through the Northwest. At the time of his death he was President of the Sturgeon Bay & Lake Michigan Canal & Harbor Company—an enterprise of the first importance to the lumber interest of Wisconsin.

His occupation of the villa on Fordham Heights, where he died, dates back only a few years. The same zeal which characterized him in Chicago caused him to devote a great deal of attention to the improvement of the railroad facilities of New York City, and to his efforts and representations is mainly due the construction by the Vanderbilt interests of the Spuyten Duyvel & Port Morris Branch, along the Harlem River. Mr. Ogden married Miss Arnot, the daughter of Hon. John Arnot, of Elmira. He leaves behind his wife, and one brother and three sisters, of his near relatives.—Condensed from New York Times.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Chicago & Iowa.—Mr. Wm. H. Holcomb has been appointed Receiver, on application of the trustees under the mortgage. He is Treasurer of the company.

Danville, Olney & Ohio River.—At the annual meeting in Casey, Ill., July 18, the following directors were chosen: J. K. Boyer, W. F. Boyer, James Dawson, Z. H. McCubbins, J. A. Merritt, Joseph Piquet, W. H. Peters, Moral Sanford, Samuel Shy. The board elected James Dawson, President; W. F. Boyer, Treasurer; W. H. Brown, Secretary; Samuel Shy, Attorney.

Minnesota Millard.—Mr. S. P. Snider is General Manager and W. S. Walton Secretary. The offices are in Wabasha, Minn.

Rochester & State Line.—The officers of this company now are as follows: Oliver Allen, President; Edward Harris, Vice-President and Attorney; James E. Childs, Chief Engineer and Superintendent; Donald McNaughton, Secretary and Treasurer. The office is in Rochester, N. Y.

Rutland.—At the annual meeting in Rutland, Vt., July 26, the following directors were chosen: John B. Page, John Prout, Rutland, Vt.; James W. Hickok, Burlington, Vt.; James H. Williams, Bellows Falls, Vt.; Edwin A. Birchard, Peter Butler, Jacob Edwards, Wm. Sohler, James S. Whitney, Boston. The board re-elected John B. Page President.

Southern Pacific.—The directors chosen at the annual meeting in San Francisco, July 18, are: David D. Colton, Charles Crocker, Jerome Madden, Charles Mayne, H. M. Newhall, N. T. Smith, J. L. Willcutt. As already noted, the board re-elected Charles Crocker, President; David D. Colton, Vice-President; N. T. Smith, Treasurer; J. L. Willcutt, Secretary.

Springfield, Athol & Northeastern.—At the annual meeting in Springfield, Aug. 7, the following directors were chosen: Willis Phelps, Homer Foot, C. R. Ladd, Wm. Birnie, Springfield, Mass.; Edward Smith, W. B. Kimball, Enfield, Mass.; F. H. Goodspeed, John C. Hill, Athol, Mass.; S. P. Bailey, Greenwich, Mass.; J. W. Goodmau, Dana, Mass.; Constant Southworth, Hardwick, Mass. The board elected Willis Phelps President; Edward Smith, Vice-President; F. H. Goodspeed, Secretary and Treasurer.

Texas & New Orleans.—Mr. C. A. Barton is appointed General Superintendent, with office in Houston, Texas. He was lately Assistant General Superintendent of the Houston & Texas Central.

Utah Western.—At the annual meeting in Salt Lake, Utah, July 20, the following directors were chosen: Brigham Young, Le Grand Young, John W. Young, S. B. Young, James Sharp, Nicholas Groesbeck, W. W. Ritter, H. P. Kimball, Salt Lake; W. C. Rydalsch, Tooele, Utah; Daniel Trowbridge, New Haven, Conn.

Wabash.—Mr. C. W. Bradley is appointed Western Traffic Manager, with office in St. Louis. Mr. C. H. Chappell succeeds Mr. Bradley as Superintendent of the Western Division, with office in Springfield, Ill. Mr. Chappell was lately on the Texas & Pacific and formerly on the Missouri, Kansas & Texas and the Chicago, Burlington & Quincy.

PERSONAL.

—Mr. W. D. Manchester, for many years Chicago Agent of the Blue Line and lately connected with the freight department of the Michigan Central, died at his residence in Chicago, July 29. A meeting of local freight agents was held on the following day, at which resolutions of respect to his memory were passed.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Seven months ending July 31:	1877.	1876.	Inc. or Dec.	P. c.
Atchison, Topeka & Santa Fe.....	\$1,239,691	\$1,239,996	Dec.	\$9,305 0.8
Chicago, Milwaukee & St. Paul.....	3,515,460	4,645,787	Dec.	1,130,327 24.3
Missouri, Kan. & Tex. St. Louis, Iron Mt. & Southern.....	1,684,050	1,642,148	Inc.	41,911 2.6
St. Louis, Kansas City & Northern.....	2,254,745	1,972,207	Inc.	282,538 14.3
Wabash.....	1,604,844	1,716,424	Dec.	111,580 6.5
Sixth months ending June 30:				
Atchison, Topeka & Santa Fe.....	\$1,036,671	\$1,045,892	Dec.	\$9,131 0.9
Net earnings.....	443,218	516,478	Dec.	73,260 14.2
Per cent. of exp'ses.....	57.25	50.61	Inc.	6.64 13.1
Louisville, Cincinnati & Lexington.....	509,314	490,496	Inc.	18,818 3.8
Mobile & Ohio.....	826,849	853,526	Dec.	26,677 3.1
St. Louis & Southeastern.....	492,485	492,485	Dec.	4,980 1.0
Net earnings.....	77,823	77,146	Inc.	477 0.6
Per cent. of exp'ses.....	84.08	84.33	Dec.	0.25 0.3
Month of June:				
Kansas Pacific.....	\$253,652	\$238,437	Inc.	\$15,215 6.4
Mobile & Ohio.....	88,949	85,832	Inc.	3,117 3.6
Nashville, Chattanooga & St. Louis.....	117,439	118,592	Dec.	1,153 0.9
Paducah & Memphis.....	13,610	14,371	Dec.	761 5.6
St. Paul & Sioux City.....	40,360	53,748	Dec.	13,388 33.2
Sioux City & St. Paul.....	21,204	31,888	Dec.	10,684 50.4
Month of July:				
Atchison, Topeka & Santa Fe.....	\$194,020	\$194,194	Dec.	\$174 0.1
Chicago, Milwaukee & St. Paul.....	556,000	685,270	Dec.	129,270 18.9
Missouri, Kansas & Texas.....	253,125	224,309	Inc.	28,816 12.8
St. Louis, Iron Mt. & Southern.....	292,468	292,821	Inc.	353 0.1
St. Louis, Kan. City & Northern.....	193,622	216,668	Dec.	23,046 11.9
Wabash.....	273,767	271,978	Inc.	1,789 0.7

Coal Movement.

Coal tonnages for the seven months ending July 28 were as follows, the tonnage in each case being only that originating on the line to which it is credited:

Anthracite:	1877.	1876.	Inc. or Dec.	P. c.
Philadelphia & Reading.....	3,374,778	2,181,395	Inc.	1,193,383 54.7
Northern Central, from Shamokin Div. and Sum't Branch.....	350,959	464,163	Dec.	113,204 24.4
Central of N. J., Lehigh Div.....	1,673,826	1,185,976	Inc.	488,750 41.2
Danville, Hazleton & Wilkesbarre.....	8,850	23,724	Dec.	14,874 62.8
Pennsylvania Canal.....	216,479	179,629	Inc.	36,850 20.5
Lehigh Valley.....	2,261,363	1,813,188	Inc.	448,175 24.7
Pennsylvania & N. Y. Delaware, Lack'wan' & Western.....	32,624	14,003	Inc.	18,621 133.0
Delaware & Hudson Canal Co.....	1,300,587	783,880	Inc.	516,707 72.5
Pennsylvania Coal Co.....	1,261,866	971,072	Inc.	290,794 22.0
State Line & Sullivan.....	629,069	510,775	Inc.	118,294 23.3
Total anthracite.....	11,136,021	8,123,134	Inc.	3,012,887 37.1
Semi-bituminous:				
Cumberland, all lines.....	739,542	969,684	Dec.	228,842 23.6
Huntingdon & Broad Top.....	74,869	90,855	Dec.	15,986 17.6
Tyone & Clearfield.....	714,100	676,090	Inc.	38,010 5.6
Total semi-bituminous.....	1,528,511	1,735,619	Dec.	206,808 11.9

Bituminous:	1877.	1876.	Inc. or Dec.	P. c.
Barclay.....	175,798	186,819	Dec.	11,021 6.0
For the last week of the period anthracite shipments were very light, owing to the strike. The Clearfield shipments were practically stopped from the same cause, and Cumberland, decreased for several weeks by the trouble on the canal, were almost entirely stopped by the Baltimore & Ohio strike. In addition to their transportation troubles the Cumberland operators now have to face a partial strike of the miners for higher wages, which threatens to become general.				
The anthracite miners' strike was very threatening at one time last week and great damage was feared from the stoppage of pumping and the consequent flooding of the mines in the Scranton region. The worst of the strike seems to have passed, however, and no more violence is feared. In the Schuylkill region the men are generally at work.				

The general effect of the strike and the anticipated decrease in production of anthracite has been an increase in prices at tide-water of about 50 cents per ton.

Grain Movement.

For the week ending July 28 receipts and shipments of grain of all kinds are reported as follows, in bushels:

	1877.	1876.	Inc. or Dec.	P. c.
Lake ports' receipts.....	3,151,091	2,983,881	Inc.	167,210 5.6
" " shipments.....	3,133,145	2,494,710	Inc.	638,435 24.1
Atlantic ports' receipts.....	2,103,374	2,621,348	Dec.	517,974 23.2

Of the shipments from lake ports, 10% per cent. were by rail this year, against 41% in 1876, 26% in 1875, and 19% in 1874. Of the receipts at Atlantic ports, 56.7 per cent. arrived at New York, 16.5 at Montreal, 9.7 at Boston, 8.1 at Baltimore, 5.6 at Philadelphia, 3.1 at New Orleans, and 0.3 per cent. at Portland. Baltimore grain receipts for July were:

	1877.	1876.	Inc. or Dec.	P. c.
Flour, barrels.....	48,894	66,033	Dec.	17,139 43.2
Wheat, bushels.....	610,596	435,102	Inc.	175,494 47.2
Corn.....	493,515	1,401,111	Dec.	907,596 64.8
Other grain.....	48,095	63,135	Dec.	15,040 23.8
Total bushels.....	1,426,676	2,329,463	Dec.	902,787 38.7

For the seven months ending July 31 the receipts were:

	1877.	1876.	Decrease.	P. c.
Flour, barrels.....	538,997	764,732	225,735	26.9
Grain, bushels.....	15,671,299	18,146,510	2,475,211	13.6
Total, bushels.....	18,466,284	21,970,170	3,503,886	15.9

Exports of flour in July were 16,000 barrels. The decrease in grain receipts is chiefly in corn.

Delaware Peach Traffic.

The peach business has now fairly begun, and the regular peach trains are carrying from 30 to 40 cars per day. Up to Aug. 3 the number of cars passing Wilmington, Del., was 300, of which about two-thirds went to Jersey City, the rest to Philadelphia.

Petroleum Traffic.

Stowell's *Petroleum Reporter* gives the Pennsylvania production of crude oil for June at 1,130,790 barrels; shipments, 1,391,124 barrels; stock on hand July 1, 2,912,674 barrels.

Shipments of refined oil from Pittsburgh during June were 118,851 barrels, of which 22,905 barrels went east by Pennsylvania Railroad; 73,916 barrels by Baltimore & Ohio; 21,156 by Ohio River and Chesapeake & Ohio Railroad, and 874 barrels west by rail.

Norfolk Cotton Business.

Receipts of cotton at Norfolk, Va., for July were 2,331 bales, a decrease of 759 bales, or 24.5 per cent. For the eleven months of the cotton year, from Sept. 1 to July 31, the receipts were:

	1876-77.	1875-76.	Inc.	P. c.
Atlantic, Mississippi & Ohio R. R.....	220,351	204,047	16,304	8.0
Seaboard & Roanoke R. R.....	250,854	215,163	35,691	14.5
Canal and otherwise.....	41,627	40,494	1,133	2.8
Total, bales.....	512,832	460,704	49,128	10.6

Of the total this year, 156,687 bales were consigned to Norfolk and 356,145 to points beyond.

THE SCRAP HEAP.

Railroad Manufactures.

The St. Charles (Mo.) Car Works have an order for box cars for the Central Branch, Union Pacific.

The Tredegar Works, at Richmond, Va., are building 225 box and 75 flat cars for the Atlanta & Charlotte Air Line.

The workmen in the National Tube Works, at McKeesport, Pa., who struck recently for higher wages, resumed work Aug. 6.

The failure of A. B. Meeker & Co., of Chicago, has caused the closing for the present of the Joliet Iron & Steel Co.'s works.

The Ohio Falls Car Works are building some passenger cars for the Minneapolis & St. Louis road, and some freight cars for the Wyandotte, Kansas City & Northwestern.

The Tennessee Iron & Steel Co. is running its mill at Chattanooga, Tenn., to its full capacity on light rails and merchant bar.

The Ironton (O.) Iron & Steel Co. has made an assignment to Thomas Cherrington for the benefit of creditors, the liabilities being stated at \$296,800. The Assignee will run the blast furnace until the stock on hand is used up.

The Peneoyd Iron Works of A. & P. Roberts & Co., Philadelphia, have some heavy orders for bridge irons.

Mr. B. W. Baldwin, of the Pittsburgh Carbon Bronze & Metal Refining Works, has received an order for a lot of his carbon-bronze from Fried. Krupp, the famous steel manufacturer, of Essen, Prussia.

The Jackson & Sharp Co., at Wilmington, Del., recently shipped five passenger cars to South America, and is building four more for the same country and three to go to Australia. The company has just received by cable, from Norway, an order to build a palace car for His Majesty Oscar II., King of Sweden and Norway. The car will be similar to the narrow-gauge palace car Dom Pedro II., built by this company for the Emperor of Brazil, and for which it was awarded the prize at the Centennial Exhibition.

The King Iron Bridge & Manufacturing Co., of Cleveland, O., has a contract for a highway bridge over the Des Moines River at Bonaparte, Van Buren County, Iowa. It will be of iron, 900 feet long, in six equal spans, and will be the longest highway bridge in the State. The specifications submitted by the different bidders were referred for examination to Major Stickney, Engineer in charge of the Government works at Keokuk, and Mr. L. M. Johnson, Chief Engineer of the Keokuk & Des Moines Railroad, and the contract was awarded in accordance with their report.

The Massillon Bridge Co., of Massillon, O., has the contract for an iron highway bridge over the Connecticut River at Sunderland, Mass. The bridge will be 840 feet long, in five spans, and the contract price is \$17,692, which does not include the flooring.

The Columbia Car Spring Co., of New York, was put in the hands of a receiver July 7, by the Supreme Court on an application made by the Attorney General to dissolve the company on account of informality in its incorporation. Subsequently, however, on all the facts being laid before the Attorney General, he overruled the action taken, and upon his motion the Court entered an order removing the Receiver and replacing the company in possession of its property.

Steam Against Wings.

The London Times of recent date says: "Yesterday there was a race from Dover to London between the Continental mail express train and a carrier pigeon conveying a document of an urgent nature from the French police. The pigeon, which was bred by Messrs. Hatley & Sons, of Woolwich, and 'homed' when a few weeks old to a building in Cannon street, city, was of the best breed of homing pigeons, known as 'Belgian voyagers.' The bird was tossed through the railway carriage window by a French official as the train moved from the Admiralty pier, the wind being west and the atmosphere hazy, but with the sun shining. For upwards of a minute the carrier pigeon circled round to an altitude of about half a mile, and then sailed away towards London. By this time the train, which carried the European mails, and was timed not to stop between Dover and Cannon street, had got up to full speed and was proceeding at the rate of 60 miles

an hour toward London. The odds at starting seemed to be against the bird, and the railway officials predicted that the little messenger would be beaten in the race. The pigeon, however, as soon as it ascertained its bearings, took the nearest homeward route, in the direction between Maidstone and Sittingbourne, the distance, as the crow flies, between Dover and London being 70 miles, and by rail 76 1/2 miles. When the Continental mail express came into Cannon street station the bird had been home 20 minutes, having beaten Her Majesty's royal mail by a time allowance representing 18 miles.

The New Des Moines Bridge.

The new iron bridge built over the Des Moines River at Des Moines, Ia., for the Keokuk & Des Moines Railroad, has been completed and tested. It is thus described by the Des Moines Register:

"The bridge was constructed by the Delaware Bridge Co., No. 52 Wall street, New York, subject to the approval of L. M. Johnson as Engineer for the railway company. The substructure consists of six piers each of two clusters of nine white oak piles 35 ft. long, driven to a plane 42 ft. below the track. The piles, each one a foot square, are bolted together and cut off two feet below the top of a cylinder of half inch iron, 5 ft. in diameter and 24 ft. long, weighing 10,000 pounds. This is sunk six feet into the gravel bottom and then filled with concrete and capped with a cast bridge seat for the truss. The concrete and piles carry the load, while the cylinder and concrete preserve the piles from rot. Each cluster has to sustain 110 tons, or 170 pounds per square inch of piling.

"The superstructure consists of five Pratt truss spans, 15 ft. wide, 21 ft. high, and 107 ft. 4 in. between pin centres.

"The strains are computed for a moving load of 3,000 lbs. and dead load of 1,000 lbs per lineal foot, with seven panels 15 ft. 4 in. long in each span. The greatest compressive strain is 7,500 lbs. and tensile strain 10,000 lbs. per square inch. The vertical posts consist of two channel bars with webs in direction of cords laced together with one-quarter inch slats. The end posts and upper chord consist of two channel bars with a plate above and lacing below. The floor beams are 20 in. deep, composed of four angle irons and a plate and end angle irons riveted to the web of the posts. The stringers are made in the same manner, with end angle irons riveted to web of floor beams. One end of each span is free to move on rollers with changes of temperature. An extra oak stringer 12 in. deep is bolted to brackets outside the south truss to receive the projecting ties which sustain the sidewalk. An iron fence four feet high has been ordered, which, with the plank floor, will soon be in place. The material and workmanship are first-class in every particular. The cost of the sub-structure and iron superstructure was \$30,000. About \$3,000 has been and will be expended in finishing with timber and sidewalk fence.

"The bridge was tested with two engines, completely covering each span. Elevations were taken at numerous points before the engines moved on, and then while they were on each span. The deflection was found to be one-quarter of an inch, which, with full inspection of all the material at each step of erection, enables the engineer in charge to declare the bridge in good order for service."

The Hawley Engine Signal.

This automatic signal had a partial trial on the New York Central last winter, and a new trial is now being given to it at a crossing on the Rochester & State Line road in Rochester, N. Y. It is thus described by the Rochester Democrat:

"First we find a hollow iron post firmly set at the side of the track at the road crossing. At about twenty feet from the ground is a square box, containing the principal portion of the mechanism, which consists of a cam lever held in its place by two spiral springs, and which controls two bolts governing the signal. From either end of this box extends a wire, communicating with a lever by the side of the rail, which can be placed at any desired distance along the track. The manner in which this wire is attached so as to get the proper force, and at the same time overcome the difficulty of the effects of heat and cold, is very ingenious and one of the most interesting features of the signal. The wire is suspended by pendulums upon telegraph poles, alternating with a sag of five feet. Now when the lever is touched the tension at once becomes perfect without the strain which would be necessary on a straight wire. To thoroughly understand this the apparatus must be seen at work; but from the above a fair idea may be gained. The lever is situated about ten inches from the rail and about six inches above. It consists of a wooden spring, in semi-circular shape, so attached that a shoe, placed on the locomotive tender, striking it, presses it down, gives a steady pressure upon the wire, which draws the bolts into the box, on the post, above mentioned, letting fall a lantern held in suspension by them. To this shaft is attached a lantern cover, a sign on which the word 'stop' is painted in large, plain letters, a white flag and a gong. If the train approaches the crossing in the day time, the shoe upon the tender of the locomotive, traveling over the lever or spring, works the mechanism in the box a quarter or a half mile away; the post and the large conspicuous sign 'Stop' comes in view. If in the night a large lantern is suddenly uncovered, giving a brilliant light, and at the same time a large and loud gong is violently sounded. When the train reaches the crossing it strikes another lever and the whole apparatus is shut up as safely as before."

RAILROAD LAW.

Penalties for Delay to Freight.

In Branch against the Wilmington & Weldon Company the North Carolina Supreme Court, after quoting the United States Supreme Court decisions in the granger cases as to the power of the State to regulate railroads, says:

"That the regulation in question is within the scope of the police power of the State seems clear to us. A common carrier is bound by the common law to carry goods committed to him for that purpose within a reasonable time, and on failure is liable to damages.

"The Legislature considered the common liability as insufficient to compel the performance of the public duty. It must have thought that the interests of local shippers, for whose interest, principally, the road was built, and against whom the company had a complete monopoly, were being sacrificed by wanton delays of carriage, in order that the company might obtain the carriage from points where there were competing lines by land or water; as from Wilmington to Augusta. It declared therefore that the maximum of delay should be five days after a receipt for carriage, and imposed a penalty for every day's delay beyond. The act does not supercede or alter the duty or liability of the company at common law. The penalty in the case provided for is superadded. The Act merely enforces an admitted duty.

"2. Having seen that the company was *prima facie* liable, we proceed to consider its excuse.

"A common carrier, especially one having a monopoly of the carriage, who invites the public custom, is bound to provide sufficient power and vehicles to carry all the goods which his invitation naturally brings to him. The quantity of local freight he can foresee, with approximate accuracy, and his first duty is to provide for that. If in consequence of special inducements held out by him, the amount of freight from distant and foreign points, or through freights

which may not be a matter of certain calculation, is unexpectedly large, he is not at liberty to delay and injure the local shipper, whose wants he foreknew and was bound to provide for, but must rather reject the distant freight, at the risk of breaking his promise, and incurring damages to those shippers, because the quantity of their freight he could not foresee, and was therefore bound absolutely to provide for only by his own voluntary promise, and not by a duty imposed by the common law.

"That the defendant did not have a sufficiency of cars in which to carry plaintiff's cotton cannot be deemed a legal excuse, when it is seen that the deficiency was in consequence of its own acts in inducing large shipments from points beyond its Southern terminus. The effect of these inducements it was bound to foresee and provide for."

"We can cite no case in which the question we have been considering has been made. But our conclusion seems just and reasonable. A delay of local shipments, caused by a lack of cars, which lack is caused by a pressure of through freight, caused by inducements held out by railroad companies, was the very evil which the Act of 1874-5 undertook to remedy; and if such an excuse is admitted, the Act is a dead letter, and we shall continue to see farmers, whose taxes build the roads, carrying their crops to market in ox carts, along the sides of the railroads.

"It appears, however, that the dependent company could have additional cars from the North, and it does not appear, that they could not have been got by ordinary diligence.

"A railroad company is bound at common law, independently of any statute, to use at least ordinary diligence in procuring a sufficiency of cars to carry all the freight tendered to it, and certainly all that is accepted by it for shipment. This principle is so reasonable that it needs no support from authority."

"The only remaining question is, for how many days did the company incur the penalty? The cotton was received and a bill of lading given on Tuesday, 10th October. It was shipped on the 19th October. The Act (1874-5, chap. 240, sec. 2) says: 'It shall be unlawful for any railroad company, &c., to allow any freight they may receive for shipment, to remain unshipped for more than five days, unless otherwise agreed, &c.; and any company violating this section shall forfeit and pay \$25 for each day said freight remains unshipped, to any person suing for the same.'

"We think that by the words 'five days' the Act meant running days, and that Sunday was one of them.

"Per curiam. Judgment below reversed, and the plaintiff will have judgment in this court for seventy-five dollars."

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.

The Treasurer's report for June and for the six months ending June 30 is as follows:

	June.	Six months.
Freight earnings.....	\$112,926 80	\$663,595 69
Passengers.....	65,737 76	329,774 86
Express, mail, etc.....	7,066 30	43,900 40
Total earnings.....	\$185,731 04	\$1,036,670 95
Operating expenses.....	114,711 41	593,482 80
Net earnings.....	\$71,019 63	\$443,218 15
Per cent. of expenses.....	61.76	57.25

As compared with 1876 there is for June a decrease of \$910.06, or 0.5 per cent., in gross, and of \$8,724.31, or 10.9 per cent., in net earnings; for the six months, a decrease of \$9,131.28, or 0.9 per cent., in gross, and of \$73,259.38, or 14.2 per cent., in net earnings. For the month the mileage was the same both years; for the six months it was 711 miles in 1877, and 683.5 miles in 1876.

Bedford, Brownstown & Madison.

The contract for building this road has been let to Irwin & Hanna, who agree to begin work within three months. The final location of the road will be begun at once. The road, which is to be of 3 ft. gauge, is to run from Bedford, Ind., east by south to Madison, about 60 miles.

Bangor & Piscataquis.

The following statement for the seven months from Dec. 1, 1876, to June 30, 1877, has been published:

Total earnings of the road.....	\$39,334
Total expenditures, including betterments.....	22,738
Net earnings.....	\$16,596
Of this amount there have been paid into the city treasury.....	9,500
Paid for new car.....	2,034
Due from sundry parties, most of which has since been paid.....	3,395
Cash on hand June 30.....	1,677
	\$16,596

The present condition of the track, engines and cars is greatly improved since the company took possession of the road. The cost of narrowing the gauge by the contracts already made and by careful estimate will not probably exceed \$15,000. The company now has available means for this purpose of more than \$5,000. When the engines are narrowed they will be worth at least \$2,000 more than they now are.

At an election held last week the city of Bangor voted by a large majority not to make any further loan of its credit to the company to aid the extension from Blanchard to Moosehead Lake. This decision will probably prevent any work this season.

Baltimore & Ohio.

The contract with the Adams Express Company having been terminated Aug. 1, as already noted, it is announced that the express business over the company's lines will, for the present, be transacted by the company itself. The business will be under the charge of the General Freight Agent, and arrangements have already been made for the local delivery and collection of express goods in Baltimore and at other points.

Chicago, Burlington & Quincy.

Notice is given that under the contracts with the several companies the sums named below have accumulated and will be applied to the purchase of their bonds at a price not above par and accrued interest. Proposals for the sale of the bonds named may be sent to John N. Devison, Assistant Treasurer, Boston, and may be for the full amount named or any part of the same:

Keokuk & St. Paul, amount applicable to purchase of bonds, \$342,709.73; proposals received until Aug. 16.

Carthage & Burlington, amount applicable, \$367,911.39; proposals received until Aug. 21.

Dixon, Peoria & Hannibal, amount applicable, \$221,908.34; proposals received until Aug. 21.

Cincinnati & Eastern.

The track of this road is now laid to Winchester, in Adams County, O., 10 miles beyond the late terminus at Sardinia and 48 miles eastward from the junction with the Little Miami road near Plainville. The road was formally opened to Winchester on Aug. 4 and trains now run to that point.

College Hill.

Work has been begun on an extension of this Cincinnati suburban road from College Hill by way of Mount Airy to Mount Pleasant, 3 1/2 miles. The extension is to be completed by Oct. 1.

Chicago & Iowa.

This company having defaulted on the coupons due July 1, a bill in foreclosure has been filed by John N. Denison and John W. Brooks, trustees, in the United States Circuit Court

in Chicago. The Court has appointed Wm. H. Holcomb, Treasurer of the company, Receiver. There were, by the latest report, \$1,750,000 bonds outstanding, of which \$1,150,000 are of the new or second issue, and it is on these new bonds that the default was made. The road is 80 miles long, from Aurora, Ill., to Forreston, and it leases the Chicago, Rockford & Northern road, which forms a branch to Rockford, 23 miles. The chief traffic of the main line is in business between Chicago and the Iowa and North divisions of the Illinois Central.

Cincinnati & Northern.

This lately organized company intends to build a narrow-gauge road from Cincinnati due north to the Michigan State line in Williams County, O., a distance of about 190 miles. The capital stock is to be \$500,000.

Dividends.

Dividends have been declared as follows:

Cleveland & Pittsburgh, 1 1/2 per cent., quarterly, on the new guaranteed stock, payable Sept. 1.

Pullman Palace Car Co., 2 per cent., quarterly, payable Aug. 15.

Des Moines & Minnesota.

Surveys are being made for an extension of this road from Ames, Ia., northwest to Rutland in Humboldt County, a distance of about 55 miles.

Detroit River Tunnel.

The Detroit Free Press of Aug. 3 says: "Gen. Scoy Smith and the English engineer, J. C. Bentley, had a very important and satisfactory interview with James F. Joy, relative to the proposed Detroit River tunnel, yesterday morning. Gen. Smith did not care to make known the precise nature of the interview, but it is an open secret that Mr. Joy guaranteed an annual patronage of the tunnel equal to \$230,000. Gen. Smith and Mr. Bentley left for Hamilton, where they expect to meet Mr. Broughton, General Manager of the Great Western Railway. At the meeting in the Russell House Wednesday night several representative Detroiters assured the General that they would contribute a bonus in aid of his tunnel in the shape of the necessary right of way. C. H. Buhl renewed his offer of \$5,000 and strongly urged the immediate commencement of the work. Gen. Smith expects to be prepared to submit definite proposals in writing not later than the 11th inst."

Delaware Shore.

It is reported that this road, which is about 20 miles long, from Woodbury, N. J., to Pennsgrove, will be extended north from Woodbury to a connection with the Philadelphia & Atlantic City road, and will be changed to 3 ft. 6 in. gauge. It is also proposed to extend the road from Pennsgrove south to Salem.

Delphos & Kokomo.

A company by this name has been organized to build a narrow-gauge road from Delphos, O., a little south of west to the Indiana line, about 27 miles.

Danville, Olney & Ohio River.

At the recent annual meeting the stockholders voted to authorize a contract for the construction of the road as a narrow-gauge road from Danville, Ill., south by west to Olney on the Ohio & Mississippi road, about 100 miles. About two-thirds of the road will be parallel and close to existing lines.

Erie.

In the matter of the application to vacate the order of reference on the question of terminating this company's contract with the Western Union Telegraph Company, the New York Supreme Court denies the application, considering the question too important for decision on a collateral order. Leave is granted, however, to the parties interested to bring a separate suit to prevent the Receiver from terminating the contract or making a new contract with the Atlantic & Pacific Telegraph Company. This suit will bring the questions involved before the Court in a distinct form.

Eastern.

On Aug. 2 the locomotives in use on this road and its branches in New Hampshire were attached under a suit brought by the Commercial Bank of Boston to recover a claim of \$130,000. The engines were allowed to continue in use, the engine-men being sworn in as deputy sheriffs and put in charge of the property.

Fond du Lac, Amboy & Peoria.

The track on this road is now laid from Fond du Lac, Wis., south to Mayville, 20 miles. A bridge at Mayville was to be erected this week, and tracklaying will be resumed then, the intention being to reach Oconomowoc, 30 miles further, this fall.

Florence, Eldorado & Walnut Valley.

This road was completed July 31 to Eldorado, Kan., 29.6 miles from the initial point on the Atchison, Topeka & Santa Fe near Florence. It is built as a branch of and leased to the Atchison, Topeka & Santa Fe. Regular trains began to run over it Aug. 3. It is proposed to extend the road next year from Eldorado to the southern boundary of Kansas at Arkansas City. The road opens a fine agricultural country, and is intended, when opened to the Indian Territory line, to secure a large part of the Texas stock traffic.

Foreclosure Sales.

Sales of railroad property under legal process are reported as follows:

Tennessee & Pacific, at Nashville, Tenn., Aug. 3, to satisfy an unpaid balance due to the State of Tennessee on the former purchase. Bought in by President Cole, of the Nashville, Chattanooga & St. Louis Company, for the amount due, payable in State bonds and overdue coupons. The road is 31 miles long, from Nashville, Tenn., to Lebanon; it has been for some months controlled by the Chattanooga Company, which now acquires absolute ownership.

Harlem Extension.

It is stated that the Central Vermont Company will continue to work this road, under a temporary agreement with the trustees, to whom the property was to be transferred Aug. 1.

Intercolonial.

The new depot at Halifax, N. S., was completed Aug. 1, and is said to be the finest depot in the Dominion of Canada. The main building is of stone, 113 feet front, with two stories and a Mansard roof, and two towers (one at each front corner) each 70 feet high. The first floor of this building contains waiting rooms and ticket offices, all handsomely finished; the second story has several offices and convenient private rooms for the local agent. In one of the towers is a clock of very fine workmanship. The baggage room, 82 by 16 feet, is in a separate building in the rear. The train-house is 400 by 87 feet, with two wide platforms and three tracks; it is covered by an iron truss roof with numerous ventilators. The building is substantially built throughout and well furnished.

Indianapolis, Bloomington & Western.

The committee which has heretofore acted for the Western Extension bondholders has submitted to those bondholders an agreement which they are asked to sign. It constitutes the committee (S. M. R. Stone, F. D. Tappen, John Welsh, Jr., H. K. Thurber and Philo C. Calhoun) a purchasing committee with all necessary authority to buy in the road at the foreclosure sale for not more than \$275,000 and to organize a new corporation, to which the road shall be transferred. The bondholders are to pay an assessment of \$5 per bond, and such fur-

ther assessments as the committee may find necessary, and to agree to hold the committee free from all liability on their behalf. The agreement is not to be valid unless signed by holders of \$2,750,000 of the bonds.

Kansas Pacific.

It is reported that the rails are being taken up from the Arkansas Valley Branch between Las Animas and La Junta, 20 miles. This section of the track is parallel and close to the Atchison, Topeka & Santa Fe road, and is doubtless of very little use.

Keokuk & Des Moines.

The difficulty between this company and the Des Moines & Fort Dodge as to the depot and bridge at Des Moines, Ia., will probably be settled without any further litigation. Representatives of the two companies met last week and agreed upon a settlement, but this has still to be submitted to the two boards of directors for their approval.

Louisville, Cincinnati & Lexington.

The report of the Auditor, Mr. Wm. Mahl, for June is as follows:

	1877.	1876.	1875.
Passengers.....	\$35,047 55	\$41,877 66	\$36,353 74
Freight.....	46,075 00	39,242 09	33,073 68
Express, mails, etc.....	6,314 83	6,844 19	6,465 66
Total.....	\$87,437 38	\$87,963 94	\$77,903 08
Expenses and renewals.....	65,903 92	65,570 88	63,124 88
Net earnings.....	\$21,533 46	\$22,393 06	\$14,778 20
Taxes, rentals, construction.....	5,961 32	6,720 06	7,320 80
Net profit.....	\$15,572 14	\$15,673 00	\$7,457 40
The earnings this year were \$420, gross, and \$104, net, per mile, the expenses being 75.41 per cent. of gross earnings. The Receiver's account was as follows:			
Cash balance, June 1.....	\$238,393 83		
Receipts from all sources.....	124,887 47		
Total.....	\$363,281 30		
Pay-rolls, vouchers, etc.....	\$88,242 47		
Coupons paid.....	118,632 99		
Louisville & Frankfort bonds paid.....	5,000 00		
	211,875 46		
Balance, July 1.....	\$151,105 84		

The disbursements were \$87,287.99 in excess of the receipts.

Lockport & Buffalo.

The New York Supreme Court has affirmed the decision of the lower court permitting this road to cross the New York Central near Tonawanda, and denying an application by the Central for a change in the route of the new line.

Lafayette, Muncie & Bloomington.

In the suit begun by A. B. Baylis, trustee, in which a receiver was appointed, Wm. T. Templeton and other bondholders have filed an intervening petition, by permission of the Court. The new petition alleges gross mismanagement of the company, especially in the contract under which the road was completed from Muncie to Lafayette.

Minnesota Midland.

This road is now under contract from Wabasha, Minn., on the Mississippi, west up the Zumbro Valley to Zumbrota, about 35 miles, and grading was to be begun last week. It is to be a narrow-gauge road.

New Brunswick.

Work is now actively in progress on the extension of this road from Andover, N. B., to Grand Falls, on the St. John River, and this section is to be completed this season. A further extension from Grand Falls to Little Falls has been put under contract, to be finished next year.

Pennsylvania.

It is announced that, in consequence of the recent losses at Pittsburgh and elsewhere, and the necessity of renewing buildings and equipment destroyed, the board has decided not to declare the usual dividend for the last quarter, but to retain the surplus for renewals.

The officers of the road are now making a thorough inspection of the line with a view of ascertaining the exact amount of renewals required. A large force is employed clearing away the debris at Pittsburgh and putting the yards there in condition for use. It is said that the new depot in Pittsburgh will be of plain and somewhat cheap construction, and that it is uncertain whether the shops there will be rebuilt.

A proposition is said to have been made by the Pittsburgh city authorities to settle with the company for the riot damages in city bonds bearing 5 per cent. interest, the amount to be ascertained by arbitration.

Portage Lake & Lake Superior Ship Canal.

The long litigation over this company's affairs is apparently ended, the United States Circuit Court having finally decided to refuse the application made by some of the bondholders to set aside the foreclosure sale made in May last. The Court held that the allegations of fraud in the sale were not supported.

The purchasing bondholders have organized a new company under the name of the Lake Superior Ship Canal, Railway & Iron Company, with a capital stock of \$4,000,000.

Portland & Ogdensburg.

A bill in equity for the appointment of receivers of the Maine company has been filed in the Circuit Court at Portland, Me., by the first-mortgage bondholders, one of the trustees under the consolidated mortgage joining in the application. It will probably be resisted by the company.

Queen Anne's & Kent.

It is announced that the owners of this road have sold a controlling interest to the Philadelphia, Wilmington & Baltimore Company for \$60,000, payable in installments. The road is 26 miles long, from Massey's, Mo., to Centerville and is one of the Eastern Shore feeders of the Delaware Railroad. It was sold under foreclosure in 1874 and bought by the bondholders. It has not been a very profitable road and the Philadelphia, Wilmington & Baltimore doubtless makes the purchase to prevent it from going to other parties.

Rochester & State Line.

This road is now open for traffic to Warsaw, N. Y., 44 miles from Rochester; track is laid three miles further and the road will be open to Gainesville Creek, 53 miles, by Sept. 1. Work is progressing rapidly on the south end of the road, where track is now laid and partially ballasted from the junction with the Buffalo, New York & Philadelphia at Machias to Ellicottville, 14 miles. The grading, masonry, etc., are entirely completed to Salamanca and the ties delivered; the iron has been delayed by the strike on the Pennsylvania Railroad, but is now moving. It is expected that the road will be completed from Rochester to Salamanca this fall.

St. Paul & Pacific.

Our Amsterdam correspondent writes that at the time of closing the subscriptions to the stock of the new Barre-Breckinridge connection only 1,620 shares out of 7,200 had been taken, and the time for receiving subscriptions was accordingly extended eight days. The committee claim that this connection will earn a high rental, but general opinion seems to be against it.

Springfield & Northwestern.

In the United States Circuit Court at Springfield, Ill., Aug. 1, a decree of sale of this road, to satisfy the claims of the bondholders, was ordered to be entered.

St. Louis, Lawrence & Western.

Pursuant to notice, the equipment of this road was sold at Lawrence, Kan., July 23, by the United States Marshal. It was bought in for \$7,100 by S. Brotherton.

St. Louis, Fort Scott & Colorado.

A company by this name has been organized at Fort Scott, Kan., to build a line from that place westward to Humboldt and thence to the Arkansas River. It is proposed to make it a part of the St. Louis, Kansas & Colorado project.

St. Louis & Southeastern.

The Auditor's report for June is as follows:

	St. Louis	Kentucky	Tennessee	Whole line.
Gross earnings.....	\$43,102 36	\$24,443 42	\$11,696 99	\$79,242 77
Expenses.....	38,360 46	20,547 36	9,828 77	68,736 59
Net earnings.....	\$4,741 90	\$3,896 06	\$1,868 22	\$10,506 18
Per cent. of expenses.....	89.21	84.21	84.01	86.74

As compared with June, 1876, the whole line shows a decrease of \$11,417.24, or 12.6 per cent., in gross earnings, and a decrease of \$14,259.98, or 57.5 per cent., in net earnings.

St. Louis, Iron Mountain & Southern.

This company did not pay the coupons due Aug. 1. on the St. Louis & Iron Mountain first-mortgage bonds, interest on which has been always punctually met heretofore.

This company is making arrangements for a new through line between Chicago and Texas points, to be known as the Missouri, Arkansas & Texas Short Line. It is said that freight and passengers will be taken from Chicago both by the Chicago & Alton and St. Louis, and by the Illinois Central and Cairo.

Union Pacific.

The changes in the channel of the Missouri River at Omaha have thrown the force of the current over towards the Nebraska shore, so that it has begun to undermine the ground occupied by the shops and yards of this company. It is feared that the river will make much trouble in this way, and the company is trying, by rip-rapping and dyking, to protect the shore and to turn the current away from that point.

Western Counties.

On Aug. 1 the Government officers took possession of the Windsor Branch, from Windsor Junction to Windsor, N. S., and subsequently transferred it to the Western Counties Company. The Windsor & Annapolis Company presented a protest and made a formal resistance to the transfer, and will begin suit to recover damages for the breaking of its lease of the branch.

Wiscasset & Quebec.

The town of Wiscasset, Me., has voted to subscribe \$60,000 to the stock of this company, which purposes building a railroad from Wiscasset to Augusta.

ANNUAL REPORTS.

Cleveland, Mt. Vernon & Delaware.

This company owns a line from Hudson, O., to Columbus, 144.04 miles; it leases the use of 0.38 mile of the Pittsburgh, Cincinnati & St. Louis track in Columbus, and it works under lease the Massillon & Cleveland road, 12.5 miles, making 156.92 miles in all. It also owns a partly graded line from Killbuck to Dresden, 34 miles. The report is for the year ending Dec. 31, 1876.

The equipment consists of 22 engines, 6 of which are hired; 14 passenger and 12 baggage cars; 68 box, 5 stock, 525 coal and 10 caboose cars.

The general account is as follows:

Stock (\$12,252 per mile).....	\$1,764,344 21
Bonds (\$30,618 per mile).....	2,969,000 00
Fund'd coupons.....	317,548 00
Coupons and interest matured.....	62,378 75
Bills, accounts and balances payable.....	99,368 31
Total (\$36,199 per mile).....	\$5,212,639 27
Road and equipment (\$32,140 per mile).....	\$4,628,159 39
Dresden Branch (incomplete).....	215,233 22
Cleve., Col., Cin. & Ind. stock.....	88 00
Bills, accounts and balances due.....	60,380 34
Coupons funded in advance of maturity.....	39,693 50
Balance to debit of income.....	269,094 82
	5,212,639 27

Under an agreement with the bondholders one-half the coupons are funded and one-half paid.

The work done for the year was as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Train mileage, passenger.....	179,698	166,764	Inc.	12.934
" " freight.....	191,556	222,178	Dec.	30.612
" " other.....	15,500	18,000	Dec.	2,500
Total.....	386,754	406,942	Dec.	20,188
Passengers carried.....	252,477	253,343	Dec.	856
Passenger mileage.....	4,536,317	4,617,061	Dec.	80,734
Tons freight carried.....	906,966	928,899	Dec.	31,933
Tonnage mileage.....	9,868,004	10,913,571	Dec.	1,045,567
Av. pass. train load, No.	25.24	27.69	Dec.	2.45
Av. freight " tons.....	51.51	49.12	Inc.	2.39
Earnings per train mile.....	\$1.0063	\$1.0953	Dec.	\$0.0890
Net.....	0.1712	0.2253	Dec.	0.0541
Earnings per pass. per cts.....	2.95	3.00	Dec.	0.05
Net per pass. per mile.....	0.42	0.15	Inc.	0.27
Earn. per ton per mile.....	2.13	2.33	Dec.	0.20
Net.....	0.15	0.44	Dec.	0.29

The earnings for the year were:

	1876.	1875.	Inc. or Dec.	P. c.
Freight.....	\$209,952 42	\$254,368 99	Dec.	\$44,416 57
Passengers.....	135,849 67	138,540 57	Dec.	4,690 90
Express, mail, etc.....	29,780 51	33,117 51	Dec.	3,337 00
Total.....	\$375,582 60	\$426,027 07	Dec.	\$50,444 47
Expe. sec.....	3,006 22	33,380 55	Dec.	29,374 33
Net earnings.....	\$372,576 38	\$392,646 52	Dec.	\$20,070 14
Gross earn. per mile.....	2,380 72	2,714 93	Dec.	334 21
Net.....	404 87	558 67	Dec.	153 80
Per cent. of exps.....	82.99	79.42	Inc.	3.57

These earnings were divided as follows:

	Earnings.	Expenses.	Net or loss.	Earn. per mile.	P. c. of exps.
Main Line.....	\$358,089 06	\$294,362 50	\$63,726 56	\$2,479 50	82.20
Ma.illon Br'h.....	15,493 54	15,637 72	194 18	1,239 43	101.25
Total.....	\$373,582 60	\$310,000 22	\$63,582 38	\$2,380 72	82.99

The result of the year was as follows:

Net earnings.....	\$63,582 38
Rest of Massillon Branch.....	\$20,000 00
Interest on Cass & Marvin bonds.....	398 99
Half int. rest on first-mortgage bonds.....	87,071 24
Interest on funded coupons.....	16,313 45
Commission.....	113 98
Deficiency.....	\$60,770 28

This was met in part from other sources, leaving \$28,350.49 in arrears at the close of the year. As it had become apparent that the company could not retrieve itself under the present

arrangement, an informal proposition for a complete reorganization was made to the bondholders, but they preferred to let matters remain as at present until a better opinion can be formed as to the capacity of the road.

There remain uncollected \$7,200 stock subscriptions considered good. No progress has been made towards the completion of the Dresden Branch.

The falling off in earnings resulted from the decrease in the coal traffic, from general depression of business and from very low rates received on through traffic. The coal business of the Massillon Branch was almost lost by a strike among the miners at the busiest season.

Atlanta & West Point.

This company works a line from Atlanta, Ga., southwest to West Point, 87 miles, of which it owns 81 miles, from East Point to West Point, and leases 6 miles, from East Point to Atlanta, from the Central Railroad of Georgia. Of late years its business has decreased, owing to the multiplication of competing lines, but it has remained in good financial condition, owing chiefly to its light capital account. The latest report is for the year ending June 30, 1877.

The equipment consists of 21 engines; 5 passenger, 4 baggage and 1 express car; 113 box, 18 stock, 23 platform, 3 coal and 5 caboose cars; 2 abanty cars.

The general account is as follows:

Stock (\$15,212 per mile).....	\$1,232,200 00
Bonds (\$1,025 per mile).....	83,000 00
Unclaimed dividends.....	1,975 00
Due agents and connecting roads.....	3,489 05
Profit and loss.....	99,906 53
Total (\$17,538 per mile).....	\$1,420,570 58
Road and equipment (\$14,741 per mile).....	\$1,194,061 22
Bills receivable and balances due.....	169,327 81
Bond exchange account.....	9,853 44
Vicksburg & Meridian preferred stock.....	3,432 00
Cash on hand.....	43,896 31
	1,420,570 58

The freight carried was as follows:

	1876-77.	1875-76.	Increase.	P. c.
Bales cotton.....	99,097	51,412	47,685	61.4
Total tonnage of freight.....	75,684	55,860	19,824	35.5

The earnings for the years were as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers.....	\$88,101 13	\$99,211 50	Dec.	\$11,110 37
Freight.....	195,481 71	169,344 99	Inc.	33,136 72
Express and mail.....	18,883 56	16,677 24	Inc.	2,206 32
Government transportation.....	10,692 42	7,265 25	Inc.	3,427 17
Total.....	\$311,158 82	\$283,498 98	Inc.	\$27,659 84
Working expenses.....	172,452 93	162,280 51	Inc.	10,172 42
Taxes.....	3,756 00	4,624 91	Dec.	868 91
Rent of Central tracks.....	6,000 00	7,000 00	Dec.	1,000 00
New rails over ordinary wear.....	22,000 00	10,000 00	Inc.	12,000 00
Total.....	\$204,208 98	\$183,905 42	Inc.	\$20,303 56
Net earnings.....	\$106,949 84	\$99,593 56	Inc.	\$7,356 28
Gross earnings per mile.....	3,876 84	3,289 61	Inc.	587 23
Net earnings per mile.....	1,229 31	1,144 75	Inc.	84 56
Per cent. of working expenses.....	55.42	57.21	Dec.	1.79
Per cent. of all expenses.....	65.62	64.76	Inc.	0.86

A summary of the income account is as follows:

Net earnings.....	\$106,949 84
Preferred stock, M. & Montgomery R. R. Co.	\$700 00
Interest account.....	6,052 68
Dividends, 8 per cent.....	98,576 00
	105,328 68
Net balance for year.....	\$1,621 16
Profit and loss balance from previous year.....	98,285 37
Balance at close of year.....	\$99,906 53

During the year 14 locomotives were changed to coal burners and fitted with Ruston's stacks; they are now working very satisfactorily. The track and road-bed have been fully maintained; the road is being fenced with barbed wire fencing, the cost being charged to expenses. A new freight depot in Atlanta and about 200 tons of steel rails are needed for the current year; they will cost about \$25,000, which can be paid from earnings.

As noted above, there was a large increase in cotton carried, the largest proportional gain being in through cotton, though local cotton also showed a large increase. There was also a very large movement of grain, chiefly from exceptional causes, which are not at work at present. A slight decrease in receipts for the current year is expected, but can, it is believed, be met by careful economy in expenses, so that dividends will not be interfered with at all.

Pensacola & Perdido.

This company owns a line 10 miles long from Pensacola, Fla., to Perdido, which is chiefly used for carrying lumber to the wharves at Pensacola. Its report is for the year ending March 31, 1877. The general statement at the close of the year is as follows:

Stock (\$12,500 per mile).....	\$125,000 00
Bonds (\$8,000 per mile).....	80,000 00
Bills and accounts payable.....	28,198 85
Total (\$23,320 per mile).....	\$233,198 85
Real and personal property.....	\$172,444 65
Sinking fund.....	6,180 00
Cash and balances due.....	2,844 84
	181,469 49

Excess of liabilities..... \$51,729 36

During the year engines ran 17,000 miles with trains and 6,000 miles in switching. The trains carried 3,275 paying passengers and moved 7,358 cars of lumber, carrying 33,230,500 feet of lumber and 769,500 feet hewn timber.

The operating account for the year was as follows:

Receipts from passengers.....	\$1,810 05
" " freight.....	35,219 98
" " dock dues and ballast.....	875 16
Total (\$3,810.22 per mile).....	\$38,105 19
Working expenses, repairs, etc. (60.34 per cent.).....	22,992 73
Net earnings (\$1,511.25 per mile).....	15,112 46
Interest on bonds and bills payable.....	\$11,192 86
Sinking fund payment.....	4,160 00
	15,352 86

Deficit for the year..... \$240 10

The gross earnings from freight and passage show an increase of \$255.13, or 6.9 per cent., over the previous year.

Three engines were in use during the year, one being laid up. Much trouble has been caused by bad water used in the engines. During the year 2,223 ties and 238 stringers have been renewed; the wharf at Perdido rebuilt and that at Pensacola repaired, and the little Bayou bridge strengthened. The additional wharf needed at Pensacola has been built by some of the mill owners interested. There is a steadily increasing demand for lumber and the prospect is for a gradually growing business.